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THE

BOOK OF NATURE.

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THE

BOOK OF NATURE.

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THE

BOOK OF NATURE.

SERIES II.

LECTURE I.

ON ZOOLOGICAL SYSTEMS, AND THE DISTINCTIVE CHARACTERS OF ANIMALS.

WHILE every department of nature displays an unbounded scope to the contemplative mind, — a something on which it may perpetually dwell with new and growing delight, and new and growing improvement; we behold in the great division of the animal kingdom a combination of allurements that draw us, and fix us, and fascinate us with a sort of paramount and magical captivity, unknown to either of the other branches of natural history; and which seem to render them chiefly or alone desirable and interesting, in proportion as they relate to animal life. There is, indeed, in the mineral domain, an awe, and a grandeur, and a majesty, irresistibly impressive and sublime; and that cannot fail to lift up the heart to an acknow-

ledgment of the mighty power which piled the massy cliffs upon each other, and rent the mountains asunder, and flung their scattered fragments over the vallies. There is in the realm of vegetables an immeasurable profusion of bounty and of beauty, of every thing that can delight the external eye, and gratify the desire; simple, splendid, variegated, exquisite. But the moment we open the gates of the animal kingdom a new world pours upon us, and a new train of affections take possession of the bosom; it is here, for the first time, that we behold the nice lineaments of feeling, motion, spontaneity; we associate and sympathise with every thing around us, we insensibly acknowledge an approximation (often indeed very remote, but an approximation nevertheless,) to our own nature, and run over with avidity the vast volume that lies before us, of tastes, and customs, and manners, and propensities, and passions, and consummate instincts.

But where shall we commence the perusal of this volume? the different pages of which, though each intrinsically interesting, lie scattered, like the sibyl leaves of antiquity, over every part of the globe, and require to be collected and arranged in order, to give us a just idea of their relative excellence, and to enable us to contemplate them as a whole.

The difficulty has been felt in all ages; and hence multiplied classifications, or schemes for assorting, and grouping into similar divisions,

such individuals as indicate a similar structure, or similar habits, or similar powers, have been devised in different periods of the world, and especially in modern times, in which the study of zoology has been pursued with a searching spirit, unknown to the sages of antiquity. — And well has it deserved to be so pursued. "This subject," observes M. Biberg, "is of so much importance, and of such an extent, that if the ablest men were to attempt to treat it thoroughly, an age would pass away before they could explain completely the admirable economy, habits, and structure even of the most imperceptible insect. There is not a single species that does not, of itself, deserve an historian." *

Before we gird ourselves then to a critical indagation into any particular part of the immense theatre which this study presents to us, it may be convenient to contemplate it upon that general survey which it is the object of such schemes or classifications to lay down; to travel over it and mark its more prominent characters by a map, anterior to our entering upon the country itself. And such are the humble pretensions of the present lecture; which will merely attempt to place before you a brief sketch of zoology, in regard to its bare outlines; for such a sketch is the whole that our time will allow; yet if it be found faithful, it will assuredly be found beneficial; for if the outlines be

* Amœnitates Academicæ Suecicæ, vol. ii. art. 19. Oeconomia Naturæ.

correctly laid down, the picture may be filled up at our leisure.

That most sublime and magnificent of all poems, ancient or modern, the book of Job, establishes, in the most satisfactory manner, that the study of natural history, and especially the history of the animal kingdom, was cultivated at a very early period of the world, — in all probability as early, at least, as the Mosaic epoch, — with a considerable degree of minute attention in regard to various kinds and species; and the detailed references to the habits and manners of other animals that lie scattered through almost every part of the Hebrew scriptures, and especially through the book of Psalms, and those of the Prophecies, and the distinct historical notice which is given of the scientific acquaintance of Solomon with this attractive study *, establish, not only that it was attended to at a very early period, but, that it was a very favourite and fashionable pursuit for many ages throughout Egypt, Syria, and Arabia. But the first physiologist who we can say, with any degree of certainty, pointed out the expediency of a methodical arrangement of animals was Aristotle. His works upon this subject have reached us; yet, while they prove that he took the same extensive and scientific view of it which he did of all other subjects, to which he directed the wonderful powers of his comprehensive mind, they prove also, that the study of natural history in Greece,

* 1 Kings iv. 33.

had by no means, in his day, kept pace with a variety of other studies; and that he did not conceive, aided as he was by all the mighty patronage of Alexander the Great, and the concurrent exertions of every other physiologist, that he was in possession of a sufficiency of facts to attempt the same kind of systematic arrangement here, which he is so celebrated for having effected almost everywhere else. He modestly contented himself therefore with pointing out the important use of such an arrangement as soon as it could be accomplished, and with suggesting a few hints as to the principles upon which it should be constructed. He observes that the distinctive characters of animals might be taken from the nature of their food, from their actions, their manners, or their different structures. That their inhabiting land or water, offers a distinction of another sort: and that of land animals, there are some kinds that respire by lungs, as quadrupeds, and others that have no such kind of respiration; that some are winged, and others wingless; that some possess proper blood, while others are exsanguineous; that some produce their young by eggs, and these he named oviparous, while others bring them forth naked, and these he called viviparous; that quadrupeds, again may, perhaps, be distinguished by the make of the foot, as being of three kinds, undivided, cloven, and digitated, or severed into toes or claws.*

* Arist. Hist. Anim. lib. i. cap. 1. cap. 3. cap. 6.

These, indeed, were mere hints, and only intended as such; but they were truly valuable and important; for they roused zoologists to that general comparison of animal with animal, which could not fail of very essentially advancing the cause of natural history; and have, in different degrees, laid the foundation of almost every methodical arrangement which has since been offered to the world.

To run over a list of these arrangements would be equally useless and jejune. The writers who have chiefly signalized themselves in this department, are Gesner, Aldrovandi, Johnston, Ray, Linnéus, Klein, Lacépéde, Blumenbach, and Cuvier; and in particular sections of it, Lamarck, Bloch, Fabricius, Latreille, and Brogniart; all of whom have flourished since the middle of the sixteenth century; most of whom have contributed something of importance to a scientific method of studying and distributing animals; and the most celebrated of whom are Ray, Linnéus, and Cuvier.

The system of Ray is derived, in its first outlines, from that recommendation of Aristotle, which suggests an attention to the different structures of different descriptions of animal life; and his observation that one of these differences consists in their possessing lungs and a sanguineous system, or their being destitute of lungs and exsanguineous.

The Linnéan method is, for the most part, built upon this general arrangement of Mr. Ray,

especially in regard to quadrupeds; it is, however, an extension of it, and certainly an improvement. That of M. Cuvier, in its subordinate division, is founded upon both these; but in its primary and leading distinctions, upon the nervous or sensorial, instead of upon the respiratory and sanguineous systems; all animals upon M. Cuvier's scheme, being primarily divided into vertebrated and invertebrated; those furnished with a back-bone, or vertebral chain, for the purpose of inclosing the spinal marrow, and those destitute of such a chain: the secondary sections, consisting of vertebrated animals with warm-blood, and vertebrated animals with cold-blood; invertebrated animals with blood-vessels, and invertebrated animals without blood-vessels.

All these, under his last modification, which is that subjoined to his Lectures on Comparative Anatomy*, are regarded as embracing nine distinct classes; as I. MAMMALS, and II. BIRDS, which belong to the warm-blooded vertebral division. III. AMPHIBIALS; and IV. FISHES, which belong to the cold-blooded vertebral division; and the five following, which fill up the division of invertebral animals. V. MOLLUSCOUS; soft-bodied marine animals, or mostly marine animals, as oysters; limpets; whelks; cuttle-fish: pipe-worms or ship-worms; defended by a testaceous covering. VI. CRUSTACEOUS; as crabs;

* Leçons d'Anatomie Comparée de G. Cuvier. 8vo. 4 tom. Paris, 1805.

various lobsters; shrimps; sea-spiders; and the monoculus tribes. VII. INSECTS; being all those ordinarily so denominated. VIII. WORMS, embracing along with those commonly so called, leeches, and various sea-worms with bristles on the sides of the body, as aphrodites, terebels or naked ship-worms, serpules, amphitrites, nereids, tooth-shells. IX. ZOOPHYTES: the term being used very extensively, so as to include, not only all the zoophytes or plant-like animals of Linnéus and other naturalists, but all their infusory, wheel, or microscopic animals; their medusas or sea-nettles, actinias or anemonies, and other efflorescent worms, urchins, and star-fishes; and thus largely infringing on the molluscous order of prior arrangements.

Many of these classes have inferior sections and subsections, under which the genera that appertain to them are respectively marshalled. But in a general outline it is not necessary to follow up the arrangement more minutely.

The common classification of zoological writers of the present day, is still that of Linnéus; and as such, it is that which I shall regularly follow up in the remainder of the present study, as being best adapted to popular purposes. It is probable, however, that the classification of Cuvier will ultimately take the lead of it; it is somewhat more abstruse, but considerably more definite; and offers a noble specimen of scientific ingenuity, applied to one of the noblest branches of scientific study; and I shall hence

advert to this classification as we proceed, for a comparison with that of the justly celebrated Swedish naturalist.

The Linnéan system of zoology divides all animals into six classes, and each class into a definite number of orders; every order consisting of an indefinite number of kinds or genera; and every kind or genus of an indefinite number of species: the individuals in each species being perhaps innumerable.

The six classes are as follows: I. mammals, or suckling animals; II. birds; III. amphibials; IV. fishes; V. insects; VI. worms.

These may be contemplated either in an ascending or a descending scale. As we have begun with brute matter, and have progressively pursued it from a shapeless mass to mineral crystallization; from mineral crystallization to vegetable organization, and from vegetable organization to animal spontaneity; it will be most congruous still to continue in the same direction, and to commence with the lowest class constituting the worm tribes.

I. Worms, in the Linnéan vocabulary, is a term of far more extensive import than in its popular signification; and the reason of this we shall perceive as we proceed. They include all animals below the rank of insects, and are classically characterised, as being mostly without distinct head and without feet; the most prominent organ being their tentacles or feelers. The class is divided into five orders; intes-

tinal, molluscous, testaceous, zoophytic, and infusory.

The FIRST ORDER or INTESTINAL, with a few exceptions which are found in the waters, consists of animals that are uniformly traced in the bowels of the earth, or of other animals; whence, indeed, their ordinal name. They are ordinally characterised as being simple, naked animals, without limbs. I shall instance as examples of it, the ascaris, which is found so frequently in the intestinal tube of mankind, in the species of maw or thread-worm, and round-worm: the tænia, which comprises among many others the two species of tape-worm and hydatid; and the filaria or Guinea-worm, which inhabits both the Indies, and is frequent in the morning dew; at which time it winds unperceived into the naked feet of slaves, or other menials, and creates the most troublesome itchings, frequently accompanied with inflammation and fever. The only method of extracting it is to draw it out cautiously by means of a piece of silk tied round its head as it peeps from the inflamed surface; for if, in consequence of too much straining, the animal should break, the part remaining under the skin will still survive, grow with redoubled vigour, and occasionally augment the local inflammation to such an extent, as to prove fatal. It is often twelve feet long, though not larger in diameter than a horse-hair.

The next intestinal worm at which it is worth while to throw a glance as we pass on, is the

fasciola or fluke, principally known from one of its species being found in large abundance in the liver of sheep during the disease called the rot, but whether the cause or the result of this disease has never yet been sufficiently ascertained. There are other species of this animal found in the stomach, intestines, or liver of various other animals, and occasionally of man himself. The fasciola is hermaphrodite and oviparous.

The gordius or hair-worm is chiefly worthy of notice as being supposed, in one of its species, if incautiously handled, to inflict a bite at the end of the fingers, and produce the complaint called a whitlow. It inhabits soft stagnant waters, is from four to six inches long, and is almost perpetually twisting itself into various contortions and knots.

The two last kinds I shall enumerate under this order of worms are, the lumbricus or earth-worm, including the dew-worm and the slug; and the hirudo or leech, both of them too well known under several species to require any farther remark in the present rapid outline. This order includes nearly the whole of M. Cuvier's class of worms, with the exception of his sea-worms, already adverted to.

The SECOND ORDER of the WORM CLASS is denominated MOLLUSCA, MOLLUSCOUS, or SOFT-BODIED SHELL-WORMS; and consists, for the most part, of similar animals to those found in snail, oyster, nautilus, and other shells, but

without a shelly defence: and hence, in their ordinal character, they are described as simple animals, naked, but furnished with limbs, of some kind or other. By this last mark they are distinguished from the preceding, or intestinal order, which, as already observed, consists of simple animals, naked and destitute of limbs. To place the order more immediately before you, I shall select a few examples from those animals that are most familiar to us, or are most remarkable for the singularity of their structure or other properties.

The limax or slug, is one of the most simple animals that belongs to this order: its only limbs are four feelers, tentacles, or horns, as they are commonly called, situate above the mouth, with a black dot at the tip of each of the larger ones, which is supposed to be an eye, though this point has not been fully established. Another genus of molluscous worms is the terebella; one species of which is the ship-worm, with an oblong, creeping, naked body, and numerous capillary feelers about the mouth, from four to six inches in length. It is sometimes inclosed in a testaceous or shelly tube, and is then called termes, pipe-worm, or shelly ship-worm, and belongs to the next order. In both forms it is peculiarly destructive to shipping; boring its way into the stoutest oak planks, with great rapidity and facility; and chiefly forming a necessity for their being copper-bottomed. The animal is, in its habits, gregarious; and

hence, in attacking a vessel, it advances in a multitudinous body, every individual punctiliously adhering to its own cell, which is separated from the adjoining by a partition not thicker than a piece of writing-paper. In a preceding lecture, however, I had occasion to observe, when glancing at the shelly ship-worm, or teredo *navalis*, that by its attacking the stagnant trunks of trees and other vegetable materials, that in many parts of the world are washed or thrown down by torrents and tornadoes from the mountains, and block up the mouths of creeks and rivers, and thus powerfully contributing to the dissolution of dead vegetable matter, it produces far more benefit than evil; the benefit being universal, but the evil partial and limited. In 1731 and 1732 they appeared in great numbers on the banks of Zealand, and considerably alarmed the Dutch, lest the piles by which these banks are supported should have been suddenly destroyed. They never, however, staid long enough to commit mischief, the climate, perhaps, being too cold for them.

Another genus worthy of notice under this order is the actinia, which includes those species of naked sea-worms which are vulgarly called sea-daisy, actinia *Bellis;* sea-carnation, a. *Dianthus;* sea-anemony, a. *Anemonoides;* and sea-marigold, a. *Calendula;* from their resemblance to the stems and flowers of these plants. The first three are found on the warmer rocky coasts of our own country, as those of

Sussex; and the last on the shores of Barbadoes. The sea-carnation is sometimes thrown upon our flat coasts, and left evacuated of its water by the return of the tide; in which case it has the appearance of a slender, long-stalked, yellow fig.

Most of us are acquainted with some species of the sepia or cuttle-fish, which is another genus of the order before us. The common cuttle-fish, sepia *officinalis*, is an inhabitant of the ocean, and is preyed upon by the whale and plaise-tribes; its arms are also frequently eaten off by the conger-eel, but are reproducible. The bony scale on the back is that alone which is usually sold in the shops, under the name of cuttle-fish, and is employed in making pounce. These animals have the singular power, when pursued by an enemy, of squirting out a black fluid or natural ink, which darkens the waters all around, and thus enables it to escape. This natural ink forms an ingredient in the composition of our Indian inks. The worm or fish, was formerly eaten by the ancients, and is still occasionally used as food by the Italians. In hot climates, some of the species grow to a prodigious size, and are armed with a dreadful apparatus of holders, furnished with suckers, by which, like the elephant with its proboscis, they can rigidly fasten upon and convey their prey to the mouth. In the eight-armed cuttle-fish, sepia *octopodia*, which inhabits the Indian seas, the arms or holders, are said to be not less than nine fathoms in length. In consequence

of which the Indians never venture to sea without hatchets in their boats to cut off these monstrous arms, should the animal attempt to fasten upon them, and drag them under water. This genus, with that of the argonauta and nautilus, constitute the order CEPHALOPODA of Cuvier, which belongs to his class named MOLLUSCÆ.

The medusa is another genus entitled to attention, as affording various species that shine with great splendour in the water. The worms of this kind are vulgarly denominated sea-nettles, and consist of a tender gelatinous mass, of various figures, furnished with arms or tentacular processes, issuing from the under surface. The larger species, when touched, produce in the hand a slight tingling and redness, and hence, indeed, the name of sea-nettles, by which they are commonly distinguished. A few of the species are found on our own coasts; but by far the greater number are exotics.

The asterias, sea-star, or star-fish, is another genus of molluscous worms, and, in some of its species, is known to all of us. The most curious species of this genus is the asterias *Caput Medusæ*, or basket-fish; which inhabits most seas, and consists of five central rays, each of which divides into two smaller ones, and each of which smaller ones again divides into two others; the same kind of division, and subdivision, being continued to a vast extent, and every ray regularly decreasing in size, till at length the ramifications amount to many thousands, forming a

beautiful net-work spread over the water. The colour of the worm varies: being sometimes pale, sometimes reddish-white, sometimes brown.

The only other genus I shall mention under this order, is the echinus, sea-urchin, or hedge-hog: its species are very numerous, and of a great multiplicity of forms, globular, oval, shield-like, and heart-shaped. Many of them appear to have long since become extinct, and are only to be found in a state of petrifaction. The surrounding spines form an admirable coat of mail when perfect; but they are generally broken off from the shell when it is picked up empty on our own coasts.

The THIRD ORDER of the Linnéan class of WORMS are called TESTACEA or TESTACEOUS; and comprise those that are surrounded with a shelly or testaceous covering. They are of three kinds; those possessing a single shell, of whatever form or kind, and hence denominated univalves; those possessing two shells, which are called bivalves or conchs; and those possessing more than two shells, which are in consequence named multivalves.

The UNIVALVES, or SINGLE-VALVED, are the most numerous, and exhibit the greatest variety of forms. For the most part they are regularly or irregularly spiral: among the most common of them may be mentioned the helix or snail-genus; the patella or limpet; and the turbo or wreath-genus, of which the periwinkle is a species; the animal in all which is a limax or slug. Among

the more curious, are the murex or purple-shell so highly valued by the ancients for the exquisite dye it is capable of producing; the volute or mitre, including those fine polished spiral shells, without lips or perforation, which so often ornament our chimney-pieces, sometimes embellished with dots, and at other times with bands of colours of various hues; the strombus, comprising the larger shells appropriated to the same purpose, spiral like the volute, but with a large expanding lip spreading into a groove on the left side, and often still farther projecting into lobes or claws, the back frequently covered with large warts or tubercles, in some species called coromant's foot; in all which, the animal or inhabitant is still a limax or slug; and the nautilus and argonauta, the pearl-nautilus and paper-nautilus; the first of which is lined with a layer of a most beautiful pearly gloss, and in the East is manufactured into drinking-cups; and the second of which is remarkable for its exquisite lightness, and the rumour common to most countries of its having given to mankind the first idea of sailing. In reality, it sails itself, and with exquisite dexterity; and to this end the animal that is usually found inhabiting the shell, and which, till of late, was supposed to be a four-armed cuttle fish, though now regarded as an ocythoe, by Dr. Leach named o. Cranchii, in memory of the indefatigable, but unfortunate branch of the British Museum *, as soon as it

* See Series I. Lect. xi. p. 283.

has risen to the surface, erects two of its arms to a considerable height and throws out a thin membrane between them, thus producing a natural sail; while the oars or rudder are formed by the other two arms being thrown over the shell into the water, by which ingenious contrivance, or rather instinctive device, the paper-nautilus sails along with considerable rapidity. M. Cuvier has separated the nautilus from the rest, though distinctly an univalve; and, as we have already noticed, has united it with the cuttle-fish, under an order of MOLLUSCÆ, which he calls CEPHALOPODA. The ordinal name for the others is with him GASTEROPODA, as most of them crawl on their bellies, and carry the shell over them as a shield. They have a distinct and moveable head, by which they essentially differ from our next order, which are without a distinct head of any kind. The two sexes are united in the same individual, but require a reciprocal union for breeding.

The BIVALVED OR TWO-SHELLED TESTACEOUS WORMS, the acephala or headless of Cuvier, are best explained by referring you to the oyster and the muscle, (ostrea and mytilus,) both which contain species that produce pearls, and mother of pearl. Though the real pearl-muscle is amya or gaper, found chiefly on the coasts of Malabar and Ceylon, where the principal pearl-fisheries are established. The species of oyster that produces small pearls is sometimes traced on our own shores, and is said to have been at one time

frequent in the river Conway, in Wales. Most of the oysters cast their spawn towards the close of the spring, or in the beginning of the summer, as the month of May. This spawn is by the fishermen called SPAT, and in size and figure each resembles the drop of a candle. As soon as cast or thrown off, these embryon disks adhere to stones, old oyster-shells, pieces of wood, or whatever other substance comes in their way; a calcareous secretion issues from the surface of their bodies, and in the course of twenty-four hours begins to be converted into a shelly substance. It is two or three years, however, before they acquire their full size.

The scallops, which are a tribe belonging to the oyster kind, are capable of leaping out of the water at pleasure, to the distance of half a yard: when elevated they open their shells, and eject the water within them, and then falling back into the water close them with a loud snap.

Among the more elegant of this division, is the nacre, pinna, or sea-pen, so called from its form; the animal of which (a limax or slug) secretes, as we have already observed, a large quantity of fine strong silky hair, or beard, which by the Italians is woven into a kind of silky plait. And among the most extraordinary is the gigantic chama or clamp-shell, in form resembling the oyster: one species of which we noticed not long since, as found in the Indian ocean, of the weight of between five and six hundred pounds; the fish or inhabitant large

enough to furnish a hundred and twenty men with a full meal, and strong enough to lop off a man's hand, and cut asunder the cable of a large ship.

Of the MULTIVALVED TESTACEOUS WORMS, or those containing more than two shells, there are but three known species, the chiton, the lepas or acorn-shell, and the phloas, or as it is often improperly called pholas, so denominated from its secreting a phosphorescent liquor of great brilliancy, which illuminates whatever it touches or happens to fall upon, and to which Linnéus chiefly ascribed the luminous appearance which the sea often assumes at a distance: a subject, however, which we shall have occasion to examine hereafter.

The FOURTH ORDER of the Linnéan class of WORMS is called ZOOPHYTES, or PLANT-ANIMALS, so denominated from their efflorescing like plants. Most of them are of a soft texture, as the hydra or polype, so well known from its being capable of existing when turned inside out, and of reproducing any part of its tentacles or body when destroyed by accident. Some are corky or leathery, as different species of the alcyonium; some bibulous, as the spongia or sponge, which is now decidedly ascertained to be an animal substance; and some calcareous, as the numerous families of coral, which, under the form of tubular, starry, or stony stems, are denominated tubipores, madrepores, and isises.

The FIFTH OR INFUSARY ORDER OF WORMS,

comprehends those minute and simple animalcules which are seldom capable of being traced, except by a microscope; and, for the most part, reside in putrid infusions of vegetables, or in stagnant waters filled with vegetable matter. Of these, the smallest known species is denominated monas. To a glass of the highest magnifying power it appears nothing more than a minute simple point or speck of jelly, obviously, however, evincing motion, but often from its delicacy seeming to blend itself with the water in which it swims.

Such is a bird's-eye view of the Linnéan class of worms, and its five orders of intestinal, mollucous, testaceous, zoophytic, and infusory animals.

The INSECTS form the NEXT CLASS in an ascending scale; classically characterized as small animals, breathing through lateral spiracles, armed on all sides with a bony skin, or covered with hair; furnished with numerous feet and moveable antennæ or horns, which project from the body, and are the probable instruments of sensation. They are so voluminous in their orders, as well as in the genera belonging to the class, (this single class containing, perhaps, as many species as are known to the whole twenty-four classes of the vegetable kingdom,) that our time will allow us to do little more than instance the names of a few of the most common and familiar kinds, under the ordinal arrangement. The orders are seven; all insects being included

under the technical names of coleopterous, hemipterous, lepidopterous, neuropterous, hymenopterous, dipterous, and apterous; or to exchange the Greek for English terms, under those of crustaceous-winged; half-crustaceous-winged; scaly-winged; reticulate or net-work-winged; membranaceous-winged; two-winged; and wingless. From all which it is obvious that the ordinal character of insects is derived from the general idea of wings; to which I may add, that under this general idea, while the individuals of the last order are destitute of wings, and those of the last but one are only possessed of two wings, the individuals of the preceding five orders have four wings each, though not particularly specified in their ordinal names.

The COLEOPTEROUS or CRUSTACEOUS-WINGED INSECTS, constituting the FIRST ORDER, are by far the most numerous; and, as the ordinal term imports, embrace all those whose wings are of a shelly or crustaceous hardness; and are subdistinguished by the nature of their antennas as being clubbed at the end, thread-like, or bristly. Among the more familiar of this order, I may mention the scarabæus or beetle-kinds, a very numerous race, equally distinguished by the metallic lustre of their wing-shells, and their attachment to dunghills, and other animal filth. The dermestes or leather-eater, the larves or grubs of one species of which are found so perpetually to prey on the bindings and books, and sometimes even on the shelves, of libraries. The

coccinella or lady-bird; the curculio or weavil, the larve of which is found so frequently in our filbert and hazel nuts, and which secretes such a quantity of bile as to give the nut a bitter taste to a considerable extent beyond the place in which it is immediately seated.

The ptinus, producing in one of its species the death-watch, is another insect belonging to this order, whose solemn and measured strokes, repeated in the dead of the night, are so alarming to the fearful and superstitious; but which, as we formerly noticed, merely proceed from the animal's striking its little horny frontlet against the bedpost it inhabits, as a call of love to the other sex. The lampyris or glow-worm; the cantharis or Spanish-fly; and the forficula or earwig: the last of which is characterised by the singularity of its brooding over its own young like a hen, and only leaving them at night, when it roams abroad in quest of food for their support. A few of these, as the lady-bird and earwig, are by M. Cuvier taken away from the present order, and, with several of the ensuing, as the cockroach, locust, and grasshopper, carried to a new order, which he has named ORNITHOPTERA.

The SECOND ORDER OF INSECTS, entitled HEMIPTERA or half-crustaceous, and by some writers RHYNGOTA, has the two upper of the four wings somewhat hard or shelly, though less so than the preceding, while the two lower wings are for the most part soft and membranaceous.

To this order belongs the coccus or cochineal insect, the blatta or cockroach, of which the chaffer is a species; the gryllus or locust, of which one species is the little cheerful chirping cricket; the cicada or grasshopper, still more celebrated for its musical powers than the cricket; and the cimex or bug, celebrated also, but for powers which you will, perhaps, spare me from detailing.

The THIRD ORDER OF INSECTS, COLEOPTERA, or SCALY-WINGED, contains but three genera or kinds; and these are the papilio or butterfly, the phalæna or common moth, and the sphinx or hawk-moth; which last has a near resemblance to both the others, and flies with a humming noise, chiefly in the morning and evening, as the moth flies chiefly in the evening and at night, and the butterfly only in the day-time. They have all a general resemblance to each other, and feed equally on the nectary of flowers: the antennas of the butterflies are mostly knobbed or clubbed at the tip; those of the moths are moniliform, those of the sphinxes tapering.

The NEUROPTEROUS INSECTS, or those with four reticulate or net-work wings, form the FOURTH ORDER of the Linnéan class; and they may be exemplified by the ephemera and hemerobius, the day-fly and May-fly of the angler, those little busy insects that surround us in countless multitudes when we walk on the banks of a river in a fine summer's evening, and the whole duration of whose life, in a perfect state, seldom exceeds two days: and often not more than as

many hours; while it has comparatively a long life in its imperfect state, or previous to its metamorphosis. It is the agnatha of several entomologists. This order is not numerous, and I will therefore only add another example, the libellula or large dragon-fly, so denominated from its ferocity towards smaller insects; usually seen over stagnant waters, the more common species, libellula *Virgo*, possessing a beautiful, glittering, and green-blue body, with wings bluish towards the middle. The larve in its internal parts, is larger than the insect, and catches its prey at a distance, by suddenly darting forward the lower lip. The tracheæ, or respiratory organs, are singularly placed at the verge of the tail. It is the odonata of Cuvier.

The FIFTH ORDER OF INSECTS comprises the HYMENOPTERA, the piezata of some entomologists, or those possessed of four membranaceous wings, most of which are armed with a sting at the tail. They of course include the apis and vespa, or wasp and bee. To which I may add the formica or ant, the ichneumon, and the cynips or gall-fly, to which we are indebted for our gall-nuts, whose peculiarities and habits I shall hereafter have an opportunity of reverting to.

The SIXTH ORDER OF INSECTS is denominated DIPTERA, and deviates from all the preceding in possessing only two wings instead of four. It includes among others the musca or common fly, the hippobosca or horse-fly, the oestris or gad-fly, the tipula or father-long-legs, and the

culex or gnat. It is sub-distinguished into such animals as possess a sucker with a proboscis, and such as possess a sucker without a proboscis. This order is the antliata of some entomologists.

The LAST ORDER OF INSECTS differs still more largely from all that have been hitherto noticed; for it consists of those kinds that have no wings whatever, and hence the class is called APTERA or wingless. To this order belong most of those insects that are fond of burrowing in animal filth, upon the animal surface; as the pulex, pediculus, and acarus, the flea, louse, and itch-insect. To the same order belongs also the aranea or spider; the oniscus, wood-louse or millepede; the scorpio or scorpion, and even the cancer or crab, and lobster: the Linnéan system making no distinction between land and water animals from the difficulty of drawing a line; of which indeed the cancer genus is a very striking example, since one of the species, cancer *ruricola*, or land-crab, is, as we have already seen, an inhabitant of woods and mountains, and merely migrates to the nearest coast once a-year for the purpose of depositing its spawn in the waters. These, however, are separated from the class of insects in M. Cuvier's classification, and form a distinct class by themselves under the name of CRUSTACEA; while the greater part of the rest, as spiders, water-spiders, spring-tails, millepedes, centipedes, and scorpions, are also carried to a distinct order of the insect class, which he has called GNATHAPTERA, leaving to

his own order of APTERA nothing more than the first three of the preceding list, the flea, louse, and tick or itch-insect.

But of all the animals belonging to this division under the Linnéan classification, I should mention, perhaps, on account of its singular instinctive faculties, the termes or white ant. The kind which inhabits India, Africa, and South America is gregarious, and forms a community, far exceeding in wisdom and policy the bee, the ant, or the beaver. The houses they build have the appearance of pyramids, of ten or twelve feet in height; and are divided into appropriate apartments, magazines for provisions, arched chambers and galleries of communication. The walls of all these are so firmly cemented that they will bear the weight of four men without giving way: and on the plains of Senegal, the collective pyramids appear like villages of the natives. Their powers of destruction are equal to those of architecture; for so rapidly and dexterously will they destroy, in less bodies, food, furniture, books, clothes, and timber of whatever magnitude, leaving in every instance the merest thin surface, that a large beam will in a few hours be eaten to a shell not thicker than a page of writing paper.

It was my intention to have finished our survey of the Linnéan system in the course of the present lecture; but the prospect swells so widely before us that it is impossible; and the remaining four classes of fishes, amphibials, birds,

and mammals, must be reserved for another study.

In the mean time, allow me to remark, that low and little as the tribes we have thus far contemplated may appear, they all variously contribute to the common good of animal being, and aid, in different ways, the harmonious circle of decomposition, renovation, and maturity of life, health, and enjoyment. The insect tribes, beautiful as they are in their respective liveries, may be regarded as the grand scavengers of nature. Wherever putridity is to be found, they are present to devour the substance from which it issues; and such is the extent and rapidity of their action, that it has been calculated by some naturalists that the progeny of not more than a dozen flies will consume a dead carcass in a shorter space than a hungry lion. Thus, while they people the atmosphere they purify it; and in many instances, perhaps, and by tribes invisible to the naked eye, purge it of those noxious particles with which it is often impregnated, and which, at certain seasons, are apt to render it pestilential.

The indefatigable labour of the worm-tribes in promoting the general good is still more striking and manifest. The gordius or hair-worm perforates clay to give a passage to springs and running water; the lumbricus or earth-worm pierces the soil that it may enjoy the benefit of air, light, and moisture; the terebella and teredo, the naked ship-worm and the shelly ship-worm,

penetrate dead wood, and the phloas and mytilus, rocks to effect their dissolution; while the termes or white ant, as we have just observed, attacks almost every thing within its reach, animal, vegetable, or mineral, with equal rapacity, and reduces to its elementary principles whatever has resisted the assault of every other species. The same system of warfare is, indeed, pursued amongst themselves; yet it is pursued, not from hate, as among mankind, but from instinct, and as the means of prolonging and extending as well as of diminishing and cutting short the term of life and enjoyment.

It has often been urged against the goodness, and sometimes against the existence of the Deity, that the different tribes of animals are, in this manner, allowed to prey upon one another as their natural food, and that a large part of the globe is covered with putrid swamps, or wide inhospitable forests, or merely inhabited by ravenous beasts and deadly serpents.

Presumptuous murmurers! and what would *your* wisdom advise were Providence to consult you upon so glaring an error? Would you then leave every rank of animals to perish by the mere effects of old age? With the example so often before you of the misery endured by a favourite horse or a favourite dog when suffered to drain out the last dregs of existence in the midst of ease he cannot enjoy, and of food he cannot partake of — a misery which often compels us, as an act of mercy, to anticipate his

fate, even at last, by the aid of violence, — would you abandon every animal to the same wretchedness, only a hundred-fold multiplied by the horrors of want and hunger which he must, by growing every day more infirm, be every day growing more incapable of appeasing? — Or would you cut short the evil at once, by destroying death itself and thus rendering every animal immortal? They would not thank you for such an interference, nor applaud the vain benevolence that might dictate it; an interference which, by preventing the necessity for offspring, would extirpate from the animal frame its best feelings; which would extinguish the wise and harmonious distribution into sexes; and make an equal inroad on the pleasures of sense and the endearments of instinct.

It is granted, that a great part of the globe is an inhospitable wilderness; that it consists, to a considerable extent, of waste inaccessible jungle over-run by rapacious beasts and reptiles, of putrid swamps crowded by myriads of venomous insects, and of immense warrens burrowed by countless hordes of the hampster, the mole-rat, and the white ant. Even here, however, wherever life exists, it exists to those that possess it as an enjoyment; while these very scenes and these very animals only fill up what man has no occasion for, and equally and instantly disappear as soon as he presents himself, and exercises that industry and ingenuity which alone consti-

tute his authority, and upon which alone his health and his happiness are made to depend.

But this is not all. — While in their different gradations these outcasts from man are thus enjoying life themselves, they are preparing, in the best manner possible, the various tracts they occupy, for his future use and habitation. The soil that supports us, and gives us our daily bread, is nothing but a mixture of animal and vegetable materials; other substances indeed enter into it, but the great, the important, the active, and leavening constituent is of an organized origin. These materials, then, are perpetually forming, and accumulating, and rising into an unbounded and inexhaustible storehouse of subsequent riches and plenty by the alternate generation and decomposition of the different kinds and orders of plants and animals which thus fill up, and, as we are apt to believe, encumber the regions we are contemplating; regions which, though in our own day unexplored or abandoned both by savage and civilised man, may, in that revolution of countries and of governments which is perpetually passing before our eyes, become, in some future period, the seat of universal dominion, the emporium of taste and elegance, of virtue and the sciences. So the fairest fields of Rome were formed out of the putrid Pontine marshes, and England has become what she is, from being a land of bogs and of blights, of wolves, wild-boars, and gloomy forests.

LECTURE II.

ON ZOOLOGICAL SYSTEMS, AND THE DISTINCTIVE CHARACTERS OF ANIMALS.

(The subject continued.)

In our last lecture we took a momentary glance at the history of zoology as a science, noticed the primary features of the best methodical arrangements to which it has given rise, and made some progress towards a brief delineation of that of Linnéus, which still takes the lead amidst the writers of the present day, and is hence chiefly entitled to attention in a course of popular study, generally collating it, however, with that of M. Cuvier, as we proceeded.

We observed that the Linnéan system comprehends all animals of every description whatever, under the six classes of mammals, birds, amphibials, fishes, insects, and worms. We pursued this arrangement in an ascending scale, as most consistent with the plan adopted at the opening of the present course of instruction; and commencing with the class of worms, finished with that of insects. It remains for us to prosecute the same rapid outline of inquiry through the four unexamined classes of fishes, amphibials, birds, and mammals.

FISHES are classically characterised in the Linnéan system as being always inhabitants of the water; swift in their motion and voracious in their appetite; breathing by means of gills, which are generally united by a bony arch; swimming by means of radiate fins, and for the most part covered over with cartilaginous scales.

The class is divided into six orders; the ordinal characters being taken from the position of the ventral or belly fins, or from the substance of the gills. The orders are, apodal, fishes containing no ventral or belly fins; jugular, having the ventral fins before the pectoral; thoracic, having the ventral fins under the pectoral; abdominal, having the ventral fins behind the pectoral. In all these four, the rays or divisions of the gills are bony. In the fifth order, which is called branchiostegous, the gills are destitute of bony rays; and in the sixth, or chondropterygious order, the gills are cartilaginous; all which will be easiest explained by a few familiar examples. Into the general divisions of this class M. Cuvier has introduced no change of any importance whatever, his own sections and names running parallel with those of Linnéus.

The kind best calculated to elucidate the FIRST or APODAL ORDER, is the well known muræna or eel; since every one must have noticed, that this fish has no ventral, or, indeed, under fins of any kind. In many of its species, it has a very near approach to the serpent tribes; insomuch that several of them are called sea-serpents, and

by some naturalists are described as branches of the serpent genus. Even our own common eel, muræna Anguilla, is often observed to quit its proper element during the night, and, like the snake, to wander over the meadows in search of snails and worms.

The next genus I shall mention, is the gymnotus, of which one species, gymnotus *electricus*, is the electric eel, an inhabitant of the rivers of South America, from three to four feet long, and peculiarly distinguished by its power of inflicting an electrical shock, so severe as to benumb the limbs of those that are exposed to it. The shock is equally inflicted whether the fish be touched by the naked hand, or by a long stick. It is by this extraordinary power, which it employs alike defensively and offensively, that the electric eel escapes from the jaws of larger fishes, and is enabled to seize various smaller fishes as food for its own use. There are, however, a few other fishes, as we shall have occasion to notice in proceeding, that possess a similar power, as the torpedo of European seas, and especially of the Mediterranean, and the electric silurus of those of Africa.

The only other genus it will be necessary to glance at under this order, is the xiphias or sword-fish; so denominated from its long sword-like and serrated snout, with which it penetrates and destroys its prey. Its chief species is found in the European and other Mediterranean seas, sometimes not less than twenty feet long; is very

active, and, in one instance, has been known to attack an East Indiaman with so prodigious a force, as to drive its sword or snout completely through the bottom of the ship, and must have destroyed it by the leak which would hereby have been occasioned, had not the animal been killed by the violence of its own exertion; in consequence of which, the snout remained imbedded in the ribs of the ship, and no leak of any extent was produced. A fragment of this vessel, with the sword imbedded in it, has been long lodged as a curiosity in the British Museum.

The JUGULAR ORDER of fishes, distinguished by the ventral or belly-fins being placed before the pectoral or chest fins, is the next in succession, and contains only six separate kinds; of which, the two most familiar to our own country, are the gadus or cod-fish, including, among a variety of other species, the haddock, whiting, and ling; and the blennius or blenny, including several species of the hake. In these the ventral or belly fins are advanced so far forward, as to be immediately under the jole.

Of the THIRD OR THORACIC ORDER, in which the ventral fins lie somewhat backwarder, and directly under the pectoral or chest fins, I may instance, among those most familiar to us, the zeus or John dorée; the pleuronectes, including the numerous families of plaice, flat-fish, flounder, sole, turbot; the eyes of all which are situate on the same side of the head, in some species, on the left side, in others, on the right, but

always on one side alone: the perca or perch, one species of which, perca *scandens*, has a power, like the eel, of quitting the water, and climbing up trees, which it effects by means of the spines on its gill-covers, and the spinous rays of its other fins; and the gasterosteus or stickle-back. Among the more remarkable or curious kinds, I may mention the echeneis, remora, or sucking-fish, which inhabits the Mediterranean and Pacific seas; and though only from twelve to eighteen inches long, adheres so firmly to the sides of vessels and of larger fishes, by its head, that it is often removed with great difficulty; and was, by the ancients, supposed to have the power of arresting the motion of the ship to which it adhered. I may also mention the chætodon *rostratus*, beaked or rostrate chætodon; an inhabitant of the Indian seas, which curiously catches for its food insects that are flying over the surface of the sea, by ejecting water from its tubular snout with so exact an aim as to strike and stun them with the greatest certainty, and hereby to bring them down into its jaws.

The FOURTH ORDER of the Linnéan class of FISHES, is called ABDOMINAL; in consequence of having the ventral or belly-fins placed considerably more backward, and behind the pectoral or chest fins: and here, as in all the preceding, the gills are bony. The salmo or salmon, with its numerous families of trout, smelt, char and grayling; the esox or pike, including the gar-

fish; the clupea or herring, which as a genus comprises the pilchard, sprat, and anchovy; the cyprinus or carp, including the gold-fish. gudgeon, tench, and a variety of similar species; the mugil or mullet, are among the more familiar kinds of this extensive order.

Of these, the herring is one of the most remarkable, from its migratory habits; and the carp, from its great longevity, having in many instances been known to reach more than an hundred years of age, and from its facility of being tamed, and made to approach the edge of a fish-pond on the sound of its dinner-bell, and to eat crumbs of bread out of a man's hand.

But amidst the most singular of the kinds belonging to this order is the exocœtus or flying-fish, which, though occasionally traced in other seas, is chiefly found between the tropics, and has a power, by means of its long pectoral fins, of raising itself out of the water and continuing suspended in the air till these fins become dry; by which means it effectually avoids the jaws of such predatory fishes as are in pursuit of it. But unhappily it is often seized at the same time by the talons of ospreys, sea-gulls, or some other rapacious birds that are perpetually hovering over the water to take advantage of its ascent. There are, however, various other fishes that have a similar power of flight or suspension, and from a similar cause, but none in so complete a degree. It is to this curious power Dean Swift makes allusion in the following lines:

" So fishes, rising from the main,
Can soar with moisten'd wings, on high ;
The moisture dried, they sink again,
And dip their wings again to fly."

The FIFTH ORDER OF FISHES is denominated BRANCHIOSTEGOUS, in consequence of its gills being destitute of bony rays ; by which it is peculiarly distinguished from all the preceding orders, and obtains a mark which has been laid hold of by Linnéus as constituting its ordinal character. It consists for the most part of a group of sea-monsters, or natural deformities, if the term might be allowed ; as the ostraceon or trunk-fish, the diodon and tretradon, sun-fish, and lump-fish, many of which are so completely truncated at either end as to resemble the middle part of any common large fish with its head and tail lopped off; the syngnathus, pipe or needle-fish ; and the lophius or frog-fish. In one of the species of this last kind we meet with a singular decoy for entrapping smaller fishes as its prey. This species, l. piscatorius, which is about seven feet long, and inhabits most European seas, lurks behind sand-hills or heaps of stone, and throwing over them the slender appendages on his head, which have the appearance of worms, entices the smaller fishes to advance and play around them till they come within his reach, when he instantly darts forward and secures them as his spoil.

The SIXTH and last ORDER OF FISHES is denominated CHONDROPTERYGIOUS, as having the gills

wholly cartilaginous, which constitutes its ordinal character. It includes, among other kinds, the acipenser or sturgeon, squalus or shark, raia or ray, petromyzon or lamprey, and gastrobranchus or hag-fish. Of these one of the most useful is the sturgeon: its different species may be ranked among the large fishes; they are inhabitants of the sea, but ascend rivers annually. The flesh of all of them is most delicious; from the roe is procured the sauce called caviare, and from the sounds and muscular parts is made isinglass. They feed on worms and other fishes, and the females are larger than the males.

This order, in the shark, contains the most dreadful of all the monsters of the main. The squalus *Carcharias*, or white shark, which often extends to thirty feet in length, and four thousand pounds in weight, follows ships with a view of devouring everything that comes in his way, and has occasionally been known to swallow a man whole at a mouthful. But in order to guard us in some degree against the perils of their presence, a peculiar stream of light issues in the dark from their tapering subcompressed bodies, which cannot well be mistaken; and as some compensation for their rapacity, we obtain from their liver a large quantity of useful oil, and find in their skin a very valuable material for carriage-traces in some countries, and for polishing wood, ivory, and other hard substances, in all countries.

The next class to that of fishes in an ascend-

ing direction is named AMPHIBIA; which, for the sake of brevity, and having no English synonym to meet it, I shall take leave now, as I have on former occasions, to render AMPHIBIALS. The term, indeed, whether regarded as Greek or English, is not very strictly precise in its present application; for it intimates an intention to include in this class all animals capable of existing in the two elements of air and water. We have already observed, however, that there are various fishes, as the eel-tribe generally, one species of the perch, and two or three of the exocœtus or flying-fish, to which many more might be added, that are capable of existing in air as well as in water; while the insect kinds offer us a still greater number that are similarly endowed, and the worms a still more numerous train. It has been said, indeed, that the animals of this class have a peculiar agreement in the structure of their organs of respiration, which makes an approach to that of birds and quadrupeds, and differs very essentially from that of fishes, insects and worms. Upon the whole, however, there is no class that offers so great a diversity in the make of its respiratory organs as the class before us, of which I had occasion to take notice in the progress of our last series of study. In the tortoise and others among the more perfect of the amphibious tribes, the remark of their approximation to the respiratory organs of the higher classes will unquestionably hold; but it will by no means hold in various cases of the

lizards; while the proper place for the siren, which is possessed of both lungs and gills, remains doubtful to this moment: it is sometimes grouped among the fishes, sometimes in the order of amphibious reptiles; while Linnéus, after having in the earlier editions of his system fixed it in this last situation, appears to have intended, had his life been spared long enough, to have formed a new order of amphibials for the express purpose of receiving it, which he proposed to denominate MEANTES.*

As the Linnéan class of amphibials at present stands, it consists of not more than two orders, REPTILES, or amphibious animals possessing feet; and SERPENTS, or amphibious animals without feet. The different kinds under each are but few: the reptiles containing only five; the testudo, draco, lacerta, rana, and siren; or, in plain English, the tortoise, flying dragon, lizard, frog or toad, and siren. The serpents comprise only seven genera; the crotalus, or rattle-snake; boa; coluber or viper; anguis, harmless snake or blind worm; amphisbæna; cœcilia; and achrochordus.

Among the REPTILES, the most extensive and important kind is the lacerta or lizard; for it includes, among other species, the alligator, crocodile, proper lizard, chameleon, salamander, newt, and eft.

* Gmelin and Camper introduced it into the class of fishes; and in Turton it occurs in the class Mammalia, order Bruta, as a variety of the trichechus manati, or lamantin.

Among the seven genera of SERPENTS, the first three, rattle-snake, boa, and viper, or rather coluber, are more or less poisonous: the rattle-snake in all its species, which are six or seven; the boa, in five, out of about seventeen; and the coluber or viper, in about thirty, out of about a hundred and thirty: the two most fatal of which last are, C. *Cerastes*, or horned serpent; and C. *Naja*, hooded serpent, or cobra de capello. In both Asia and Africa we meet with whole tribes of barbarians, who are capable of handling the most poisonous of these amphibials, and of eating them up alive from head to tail, without the smallest injury: even the bite itself producing no mischief. These barbarians, some of whom were known to the Greeks and Romans, and are particularly alluded to by Celsus and Lucan, were formerly called Psylli. The power they affect has been laughed at by M. Denon, but without any kind of reason for derision. It is a curious subject, however, and connected with others of equal singularity; and must, therefore, be reserved for a future study.*

The poisonous serpents differ from each other in their respective kinds, by having their bodies more or less covered with scuta or plates, instead of with mere scales; excepting that the rattle-snake is chiefly distinguished by the rattle at his tail. The four harmless genera are characterised by having their bodies covered altogether with simple scales, and never with

* See Lect. vi. of this Series.

plates, or as being ringed, wrinkled, or tubercled.

This class is not much disturbed by M. Cuvier's later arrangement; but he has separated the tortoises from the lizards, denominating the first, as an order, CHELONIA; and the second, SAURIA; and has removed the frogs, salamanders, and siren, into a fourth order, to which he has given the name of BATRACHIA, characterising them by the possession of a naked skin; feet; with branchiæ in the young.

But we must hasten in our rapid career to the BIRD CLASS, distinguished by having the body covered with feathers and down; protracted and naked jaws; two wings, formed for flight; and biped. This class consists of six orders: accipitres; picæ; anseres; grallæ; gallinæ; passeres. In English synonyms, birds of prey; pies; web-footed birds; waders; gallinaceous birds; and the mixed class of thrushes, sparrows, and finches. These orders are chiefly distinguished from each other by the peculiar make of the bill, and of the feet. Under M. Cuvier's classification the divisions, and even the names are the same, with the exception that for picæ, or pies, he has given the better appellation of scansores or climbers. Every one of them, or rather every distinct kind under every one of them, might agreeably occupy us through an entire lecture; so curious, so attractive, so interesting, are their structures, their powers, their habits, their instincts. But all

these must be reserved for subsequent studies. * Our only concern at present is to give a glance at the manner in which they are grouped under the Linnéan system. It is the mere alphabet of the science to which we must at present confine ourselves.

The ACCIPITRES, or predacious birds, constituting the FIRST ORDER, with a bill somewhat hooked downward, and four claws hooked and sharp-pointed. It consists of not more than four genera, the vulture, including the conder, (v. *Gryphus*,) as one of its species; the falco, including the numerous families of the eagle, falcon, hawk, osprey, buzzard, and kite, together with various others; the owl, and the lanius, or shrike, of which the butcher-bird, (l. *Collurio*,) is one of the chief species.

The PICÆ or PIES, form the SECOND, and most numerous order. The bill is here compressed and convex, which constitutes the ordinal character. A secondary distinction, taken from the feet, divides them into tribes formed for perching, formed for climbing, or formed for walking. To this order belongs the trochilus, or humming-bird, the minutest animal of the bird tribes; and which seems to connect the bird with the insect-class. In one of its species, trochilus *minimus*, or least humming-bird, it sometimes does not weigh more than twenty grains, nor measure much more than an inch;

* See Lect. iv. v. viii. ix. of this Series.

it is consequently less than several of the bee tribes, and like the bee, feeds on the nectar of flowers, which it hovers about and extracts while on the wing, with a delighted hum.

To this order also, from similarity of bill and foot, belong the very numerous families of the psittacus or parrot kind, including the proper parrot, maccaw, parrakeet, cockatoo, and lory; equally celebrated for their imitative powers, their longevity, and the splendid variety of their colours; the paradisea, or bird of Paradise, chiefly a native of New Guinea, and distinguished by the long and taper elegance of its bending feathers; the monstrous rhamphastos or toucan, whose bill is, in some species, larger than its body, and whose tongue is quaintly tipped with a bundle of feathers, probably answering the purpose of an organ of taste.

All thus far glanced at are exotics. Among the kinds a few of whose species are inhabitants of our own country, I may mention the social and clamorous corvus or crow-tribe, including the rook, raven, jay, jack-daw, and various others; the picus or wood-pecker, that drives into the stoutest and toughest timber-trees of the forest its hard and wedge-like bill, and often with a force and echoing sound like the stroke of the woodman; and whose bony and pointed tongue transfixes the various insects upon which it feeds, and in this state not unfrequently draws them out from a considerable depth in the bark of trees into which they have crept for

protection. The alcedo, or kingsfisher, is another genus of this order, whose species haunt streams and rivers for the little fishes on which they feed, and are most dextrous anglers in catching them. To these we may add the cuculus or cuckoo, that, with the same want of natural affection which marks the ostrich, builds no nest for its eggs, except under particular circumstances, but avails itself of that of the hedge-sparrow, or some other bird, and abandons to foster-parents the care of its eggs.

The THIRD ORDER of birds is denominated ANSERES, and in English WEB-FOOTED: they are ordinarily characterised by having the bill covered with skin, broad or gibbous at the tip, and a palmate or web-foot, formed for swimming: the tongue is uniformly fleshy, and the bill, in many instances, denticulate or toothed. It includes only thirteen kinds, of which I may take as examples, the anas, comprehending the very numerous families of duck, goose, swan, wild duck, teal and shoveler; the mergus or merganser; alca or awk; aptenodytes or penguin; pelecanus or pelecan; colymbus, comprising the grebes, guillemots and divers, and procellaria or petrel. The petrels have an extraordinary habit of spouting from their bills a considerable quantity of oil upon any object that offends them. The procellaria *pelegica*, or stormy petrel, is the most daring of all birds during a tempest, though not more than six inches long. The moment he beholds the black clouds collecting, he quits

his rocky retreat and enjoys the magnificent and growing spectacle; he darts exultingly athwart the concave, and skims with triumphant temerity the loftiest peaks and deepest vallies of the most tremendous waves. The appearance of this bird is, to the sailor, a sure presage of an approaching storm.

The GRALLÆ or WADERS, from the FOURTH order of birds in the Linnéan system. They are characterised by possessing a roundish or subcylindric bill, a fleshy tongue, and legs naked above the knees. The ardea, or genus that includes the herons, cranes, and bitterns, is the most numerous. The scolopax, which includes the curlew, snipe, and woodcock; the tringa, which includes the sandpiper, the ruff and reeve, and the lap-wing or pewit; the fulica, which includes the gallinule, coot, and moor-hen; and the charadrius or plover are among those that are most familiar to us. To this order also belongs the tantalus or ibis, so celebrated for the divine honours paid to it for many ages throughout Egypt; and, at least, a most valuable bird from its clearing the land of those numerous reptiles and insects, which are left upon its surface after the exundations of the Nile. It is the abu-hannes of Bruce, which, however, M. Cuvier regards as not properly a tantalus; and has, consequently, made a distinct genus for receiving it, to which he has given the name of neumenius; and hence, under his classification, it is a Neumenius *Ibis*, instead of a Tantalus *Ibis*.

The FIFTH ORDER embraces the GALLINÆ or GALLINACEOUS BIRDS; those which strictly come under the denomination of poultry. They are chiefly characterised by having a convex bill, with the upper mandible arched. They are the least numerous of all the orders next to the ACCIPITRES, and extend to not more than ten kinds or genera; many of which, however, are very extensive in their species. The kinds most familiar to us are the phasianus or pheasant, including all the families, and their numerous varieties of common cock and hen; the tetrao or partridge, including all the families and their numerous varieties of grouse, red-game, black-game, ptarmigan, and quail; the pavo or peacock; and meleagris or turkey. To this order also belong the numidia, pintado or guinea-hen, the otis or bustard, the didus or dodo, and the struthio, including those large and stately birds, the emeu, cassowary, and ostrich: the last of which, though incapable of flying, derives from its wings a fleetness of running, that is unrivalled by any animal whatever. This bird is capable of being tamed, and may be conveniently rode; and Adanson asserts, that, when mounted, it will surpass the speed of the most rapid courser. He tells us, that while he was at the factory at Podore, he was in possession of two tame ostriches, the oldest of which, though young, would carry two negroes upon its back, with a rapidity superior to what has ever been exhibited by the fleetest racer upon the Newmarket turf.

The LAST ORDER of the bird class is entitled PASSERES, for which, in the sense here intended, we have no exact English synonym: but it is designed to include various kinds and families, which, for the most part, may be denominated small birds, and singing birds. They are characterized by having the bill conic, and sharp-pointed; and the nostrils naked. To this order belongs the alauda or lark kind; the columba, pigeon, and dove kind; the emberiza or bunting, including the yellow-hammer; the fringilla or finch, with all its numerous species of gold-finch, green-finch, thistle-finch, linnet, and sparrow; the hirundo, including the swift, swallow, and martin; the loxia or grosbeak, including the bull-finch and haw-finch, the only finches, I am at present aware of, that do not belong to the fringilla genus: and the motacilla, a most interesting group, as including the nightingale, whose song surpasses that of all the singing birds of the grove; and the red-breast, whose song is, indeed, less sonorous and striking, but who is so justly celebrated and beloved for his social qualities; together with all the amusing species and varieties of wrens and wag-tails. To the order of passeres appertain also the pipra or manakin, some of which are peculiarly musical; and the turdus, comprising those sweet melodious choristers, the thrush, the throstle, and the blackbird.

Such is a brief and scanty survey of the interesting and instructive class of birds: and

thus, in the elegant language of the poet of the Seasons,

> Innumerous songsters, in the freshning shade,
> Of new-sprung leaves, their modulations mix
> Mellifluous. The jay, the rook, the daw,
> And each harsh pipe, discordant heard alone,
> Aid the full concert: while the stock-dove breathes
> A melancholy murmur through the whole.*

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* Catalogue of singing birds, with the time of their beginning and ceasing to sing, from a mean of five years' observation, with the numerical value of their notes, twenty being that of absolute perfection. From an interesting article by Mr. John Blackwell, in Memoirs of the Literary and Philosophical Society of Manchester. Second Series, vol. iv.

Name.	Begins.	Ends.	Mellowness.	Sprightliness.	Plaintiveness.	Compass.	Execution.
Redbreast	Jan. 3	Dec. 14	9	8	12	14	14
Wren	do. 13	do. 3	1	16	0	2	5
Missel Thrush	Feb. 1	May 28	3	4	1	5	3
Throstle	do. 8	Aug. 12	3	10	2	10	4
Skylark	do. 9	July 8	4	19	4	18	18
Hedge Warbler	do. 9	do. 19	3	4	3	4	4
Chaffinch	do. 10	do. 7	2	14	1	4	5
Starling	do. 15	May 30	4	2	2	4	2
Blackbird	Mar. 20	July 13	8	1	4	5	3
Green Grosbeak	do. 24	Aug. 12	5	3	5	5	5
Titlark	Apr. 4	July 9	3	2	2	2	2
Lesser Redpole	do. 5	Aug. 5	1	4	0	3	3
Woodlark	do. —	Oct. 25	18	2	17	8	6
Goldfinch	do. 11	June —	4	16	4	10	12
Redstart	do. 14	do. 29	1	4	0	2	2
Willow Wren	do. 14	Aug. 23	6	4	5	5	5
Linnet	do. 15	July 6	10	15	6	12	19
Lesser Field Lark	do. 17	do. 8	8	7	5	4	5
Swallow	do 19	Sept. 25	4	6	2	3	3
Stonechat	do. 24	June —	1	3	0	3	2
Whinchat	do. 25	July 1	1	3	0	2	2
Blackcap	do. 25	do. 22	14	19	12	10	8
Whitethroat	do. 29	do. 16	1	4	0	3	3
Patty-chaps	May 12	do. 11	14	6	14	10	9
Sedge Warbler	do. 17	do. 16	2	16	0	18	14

Nor should we suffer their other curious endowments to pass by us unnoticed. The muscles, and delicate plumage of their wings, give them not merely the power of flight, but under different modifications, a nearly equal command over earth, air, and water: for such a provision enables the rail, destitute as he is of a webbed-foot, to rival, in swimming and diving, the guillemot; the ostrich, as we have just observed, to outstrip in running the speed of the race-horse; and even the diminutive swallow, and various other migratory birds, to double, when on the wing, the pace of the fleetest ostrich; and to dart, twice a year, across the Atlantic and Mediterranean, often at the rate of a mile in a minute for several minutes in succession; and perhaps generally, and with perfect ease, at the rate of a mile every two minutes, or upwards of seven hundred miles every twenty-four hours, till it reaches the precincts of its summer or winter residence.

We ascend to the FIRST and HIGHEST CLASS—to that rank of animals which is most complicate in form, and most competent in power. This class is chiefly distinguished by the possession of lungs, and an organ for suckling; and most of its kinds possess four supporters in the shape of hands or feet, or both. To this last character the class was formerly indebted for its classic name, which was QUADRUPEDS, or FOUR-FOOTED. As some of the kinds under it, however, in its modern arrangement, are possessed of no sup-

porters of any sort, either hands or feet; others have four hands and no feet; and others, again, have two of each, the absurdity of retaining such a name must be obvious to every one; and hence it has been correctly and elegantly exchanged by Linnéus, for that of MAMMALIA, from the mammary or suckling organ which belongs to every kind of the class, as it stands at present, and to no kind whatever out of it: and which, as we have no fair synonym for it in our own tongue, I shall beg leave now, as I have on various other occasions, to render MAMMALS.

The class is distributed into seven orders; the characters of which are taken from the number, situation, and structure of the teeth. The seven orders are as follows:—primates, bruta, feræ, glires, pecora, belluæ, cete. It is difficult to find English synonyms for these Latin terms, which, in several instances, are used in a kind of arbitrary sense, not strictly pointed out by the terms themselves. The following are the best that occur to me: chieftains; brute-beasts; savage-beasts; burrowing-beasts; cattle; warriors; and whales.

The FIRST ORDER, PRIMATES OR CHIEFTAINS, is distinguished by the possession of four cutting teeth in each jaw. This mark would also include the race of man; and Linnéus has actually included him in the order before us, as he is included in the class by Cuvier and most of the naturalists. From such arrangements, however, I shall take leave to differ. Man ought to stand

by himself; he has characters peculiar to himself, and which place him at an infinite distance from all other animals. With this exclusion, the entire class is reduced to three kinds, the simia or monkey; the lemur or maucauco; and the vespertilio or bat: kinds which can only be collectively entitled to the appellation of primates or chiefs, from their very slight resemblance to man in the general distribution of the teeth: for though a few of the monkey tribes have an approximation in their exterior and erect form, in the greater number this character is very inappreciate, while it is nearly lost in the lemur, and altogether so in the bat.

Among the simia kind, the most singular species is certainly the ourang-outang, especially the grave, gentle, and very docile Pongo. I have only time to observe farther upon this kind, that those without tails are denominated apes; those with short tails, baboons; and those with long tails, proper monkeys. Among the lemurs, the most curious, perhaps, is the l. *volans*, or flying maucauco, the galiopithecus *volans*, or flying colugo of Pallas and Shaw; an action which he is able to accomplish from tree to tree by means of a strong leathery membrane that surrounds the body and reaches from the head to the fore-feet, hind-feet, and extremity of the tail; and which gives him an approach to the bat.

Of the vespertilio or bat kind, which is well known to fly only by night, and by means of an expansive membrane, instead of by wings, one of

its most extraordinary faculties is that of a knowledge of the presence, and apparently of the approach of objects, by some other sense or medium than that of vision; for when deprived of its eyes, this knowledge, and a consequent power of avoiding objects, seems still to continue. The vespertilio *Vampyrus*, or ternate bat, an inhabitant of India and Africa, is said to be fond of blood, and occasionally to fasten on such persons as he finds asleep, and to suck their veins till he becomes bloated. He might hence, under proper management, be rendered an able and valuable substitute for the leach. In poetry he has often been introduced, under the name of vampire, as a most hideous and appalling monster.

The SECOND ORDER, BRUTA, OR BRUTE-BEASTS, is distinguished by having no fore-teeth in either jaw. It includes the nine following kinds: rhinoceros, sukotyro, elephant, trichecus,—the morse, walrus, manate or lamantin, the dolphin of the poets of Greece and Rome, by whom it has been celebrated for its love of music, and perhaps not altogether without foundation;—the bradypus or sloth, the myrmecophagus or ant-eater, the manis or pangolin, the dasypus or armadillo, and the platypus or duck-bill, the ornithorhynchus, *paradoxus* of Blumenbach; that curious little quadruped which has hitherto only been discovered in Australasia, or the regions in and about New South Wales; and which seems to be a quadruped by its feet, a

water-fowl by its bill, and an amphibial by its fondness for water. It is not yet quite certain whether this singular animal suckles its young, or has a mammary organ for this purpose; and if not, it must be discarded from its present situation, though we should be at no small loss to know where else to place it.

The THIRD CLASS of MAMMALS is denominated FERÆ or SAVAGE-BEASTS; and is distinguished by having, in every instance, fore-teeth, above and below, the number varying in different kinds, from two to ten; and in possessing a solitary tusk. The order comprises eleven kinds, the names of which are as follows: the phoca or seal, a water-quadruped, whose skin is so useful to us for various purposes; and which, like the stag, is found to shed tears when in trouble: the canis or dog-kind, including the numerous families of wolf, fox, jackal, hyæna: the felis or cat-kind, including a variety of tribes of a somewhat similar appearance, but far mightier, and nobler in their powers, as the lynx, the leopard, the panther, tiger, and lion, all of which have a power of climbing trees, though the weight of the larger species makes them do it very awkwardly, and only to a short height; all of which pitch on their feet in falling; and all of which see better in the night than by day: the viverra, including the ichneumon, and several of the weasels: the mustela, including other species of the weasels, the stoat, pole-cat, otter, ferret, sable and ermine; to the two last of

which we are indebted for the luxurious dresses that pass under their name. Almost all of the mustelas have a power of secreting and discharging a most fetid and intolerable stench at their will; and many of them do it as a mean of defence: and often so effectually that the very beast that pursues them is compelled to relinquish the chace, so completely is he overpowered by its noisome vapour. The remainder of this order are the ursus or bear; the didelphis or opossum; the marcopius or kangaroo, which is now naturalizing in the royal parks of our own country; the talpa or mole; the sorex or shrew; and the erinaceus or hedgehog: which last is capable of being tamed, and is actually tamed by the Calmucs, and made a very useful domestic servant in destroying mice, toads, beetles, and other vermin.

The FOURTH ORDER of mammalian animals is denominated GLIRES, for which we may use the words HYBERNATERS, or BURROWERS. They are distinguished by having two fore-teeth in each jaw, close to each other, but remote from the grinders; and being without tusks. They all, in a greater or less degree, burrow in the earth, and almost all of them sleep through the whole, or a great part, of the winter. To this order, therefore, we can all of us, of our own accord, refer the ten following kinds, which are the whole that are included under it. The hystrix or porcupine; the cavia or cavy; the castor or beaver; the mus genus, comprehending the numerous families of the mouse and rat; the arc-

tomys or marmot; the sciurus or squirrel, some of which have a long flying membrane that enables them to vault from tree to tree, like some species of the lemur; the myoxus or dormouse; the dipus or jerboa, whose form resembles the kangaroo, but whose habits the dormouse; the lepus, comprising the hare and rabbit tribes; and the hyrax or daman: with most of which we are too well acquainted to require any detailed account in so cursory a survey as the present.

The PECORA or CATTLE kinds form the next or FIFTH ORDER, and comprehend those horned quadrupeds which are most familiar and most useful to us. To this division, therefore, necessarily belong the bos, ovis, capra, and cervus kinds; or, in our own language, the ox, sheep, goat, and deer; and, as connected with these, in habits as well as in external appearance, the moschus, antilope, camelus—the musk, antelope, camel and camelopard, or giraffe. They are ordinally distinguished by being without upper fore-teeth, but having six or eight in the lower jaw, remote from the grinders. They have all four stomachs, are hoofed, and have the hoof divided in the middle; and, except the camel, have two false hoofs, which, in walking, do not touch the ground. Such as have horns have no tusks, and such as have tusks have no horns: they ruminate or chew the cud; and from the torpid action of their multifid digestive canal, are apt to have balls form in different parts of it, owing to the frequent concretion of their food,

occasionally intermixed, but more usually covered, with a quantity of hair, which they lick from their bodies. Some of these balls are of a whitish hue, and will bear a fine polish, and are known by the name of bezoards. These are chiefly the production of the antelope kind; and were formerly in very high estimation as amulets, and febrifuges.

The SIXTH ORDER of mammals embraces the BELLUÆ or WARRIOR KINDS, possessing both upper and lower fore-teeth, and hoofed feet. The order consists of only four genera; the equus or horse, mule and ass tribes; the hippopotamus or river horse; the tapir, which in appearance and habits makes an approach to the river-horse, but is smaller in size; and the numerous families of the sus or swine kind.

The LAST ORDER under the mammalian class consists of the CETE or WHALE KINDS, and embraces the monodon, sea-unicorn or narwahl; balæna, common whale; physeter, cachalot, or spermaceti whale; and delphinus or dolphin, including as two of its species the phocœna or porpoise, the orca or grampus, and the dudong.

There is some force in introducing these sea-monsters into the same class with quadrupeds: but they are still continued here by M. Cuvier. They have a general concurrence of structure in the heart, lungs, backbone, and organ for suckling; but their teeth have little resemblance; and they have neither nostrils, feet, nor hair; instead of nostrils, possessing a spiracle or blow-

ing-hole on the fore and upper-part of the head; and instead of feet, fins; in which, as well as in their general habits, manners, and residence in the waters, they have a close resemblance to fishes. These are chiefly inhabitants of the polar seas, and several of the larger species afford materials that are highly valuable as articles of commerce or manufactures. All of them produce a considerable quantity of blubber or the basis of the courser animal oils; the common whale sometimes to as large a quantity as 6 or 8,000lb. weight: from the horny laminæ of whose upper jaw, as well as from that of the balæna *Physalus* or fin-fish, we obtain also extensive layers of whalebone; while the cachalot supplies us with spermaceti from its head, and with ambergris from some of its digestive organs; a substance, however, only to be procured from such organs when the animal is in a state of sickness. The most warlike of the order is the grampus, which will often engage with a cachalot or a common whale of double its size, and continue the contest till it has destroyed it.

To this order also belongs the dudong or sea-cow of Sumatra, which has of late excited so much attention among naturalists. It was at one time supposed to be a hippopotamus or river-horse, but Sir Thomas Raffles has of late sufficiently proved it to be a cetaceous mammal. It is usually taken on the Malacca coast by spearing; its length is often from eight to nine feet. Its front extremities are two finny

paddles; its only hind extremity is its tail, which is a very powerful instrument. It is never found on land or in fresh water, but generally in the shallows and inlets of the sea; the breasts of the adult females are of a large size, and especially during the time of suckling. Its food seems to consist entirely of fuci and submarine algæ, which it finds and browses upon at the bottom of the shallow inlets of the sea, where it chiefly inhabits. Its flesh resembles that of young beef, and is very delicate and juicy. *

In M. Cuvier's arrangement the class of mammals is entirely recast, and divided into three orders, or principal sections, as distinguished by claws or nails, by hoofs, or by fin-like feet; while the whole of these orders are further subdivided into eleven distinct families, of which the first six belong to the first order; the three next to the second; and the two last to the third.

The six families belonging to the first order, the nail or claw-footed, are these:

I. Bimanum: two-handed. Thumbs separate on the superior extremities only. Designed to include man alone.

II. Quadrumana: four-handed. Thumbs or great toes separate on each of the four feet. Monkies and maucaucoes.

III. Sarcophaga: flesh-feeders. No separate thumbs or great toes on the anterior extremities. Bats, flying lemurs, hedge-hogs, shrews, moles, bears, weesels, civets, cats, including the lion

* Phil. Trans. 1820, p. 174.

and tiger-tribes; dogs, including the fox and wolf-tribes, and the opossums.

IV. Rodentia: gnawers. Want the canine teeth only. Cavies, beavers, squirrels, rats of all kinds.

V. Edentata: edentulate. Want both the incisive and canine teeth. Ant-eaters, pangolins, and armadillos.

VI. Tardigrada: slow-footed. Want only the incisive teeth. Sloth tribes.

The three families belonging to the second, or hoof-footed order, are the following.

VII. Pachydermata: thick-skinned. More than two toes; more than two hoofs. Elephants; tapirs, hogs, hippopotamus, rhinoceros, and hyrax or damon.

VIII. Ruminantia: ruminants. Two toes; two hoofs. Camels, musks, deer, giraffes, goats, sheep, oxen.

IX. Solipeda: single-hoofed. One toe, one hoof. Horse alone, including the ass-tribe.

The two families belonging to the third, or fin-footed order, are the following.

X. Amphibia: amphibials. Four feet. Seals, and morses. This family name should be changed, since the same term is also employed by M. Cuvier, after other naturalists, as the name of a distinct class of other animals.

XI. Cetacea: cetaceous. Feet fin-like. Manates or lamantins, dolphins, cachalots, whales, and narwhals.

We have thus run rapidly over a map of the different classes and kinds of animals as they

are found extant in our own day. But those traced in a living state in our own day are by no means the whole that have existed formerly. In the lecture on Geology, in the preceding series *, we had occasion to observe that the various formations of rock, and especially the transition formations, open to us very numerous examples of whole families now no longer in existence; many of which have probably ceased to exist for several thousands of years; some of which indeed are so far removed from the races of the present day, as to require the invention of new genera, if not of new orders, in a zoological arrangement for their reception.

Stukeley, Lister, and other paleologists and naturalists of the last century, paid no small attention to this subject, and dragged forth the unrecognized relics of various animals from their fossil abodes: but it has since been pursued with extraordinary spirit and activity by the concurrent labours of Karg, Schlottheim, Fischer, Espen, Collini, Blumenbach, Humboldt, Werner, Buckland, and above all others, Cuvier; insomuch that the ascertained lost kinds bid fair in process of time to be almost as numerous as those that are living.

The last physiologist is well known to have formed a most valuable and extensive museum for the reception and arrangement of fossil animal remains; and so rich and varied is his possession, that he has commenced and made a

* Vol. I. Ser. I. Lect. vi.

considerable progress in a classification for systematically distinguishing them. The alluvial soil of our own country has furnished him with numerous examples; the shell-marl and peat-bogs of Ireland with one or two of still more striking character, and particularly with specimens, more or less perfect, of its enormous elk, one of the most celebrated of all the fossil ruminating animals. The Mediterranean coast, Russia, and both Americas, have amply contributed to the collection. But it is to the lime-stone quarries of Æningen and Geyleureuth, and the alternating quarries of Paris, that it is chiefly indebted for its very interesting supply of the animal remains of a former world.

We have not time to travel even over an outline of this wonderful repository. Those who have no opportunity of examining it on the spot, may be abundantly gratified by a perusal of M. Cuvier's valuable and extensive work on the fossil remains of quadrupeds*: which, though chiefly devoted to this particular class, is nevertheless rich in its history of extinct kinds and species of birds, amphibials, and fishes. We can only glance at a few of the more striking of the whole collection.

These are to be found chiefly in the class of mammals, and espeeially among the largest kinds. The gypsum formation of Paris, supposed to be

* See also Mr. Kerr's Translation of M. Cuvier's Essay on the Theory of the Earth, with Professor Jameson's Notes. 8vo.—Edin.

a fresh-water deposit, has furnished M. Cuvier with two entirely original genera, and each genus with several species, the whole of which appear to be utterly extinct.

To these he has given the name of palæotherium and anoplotherium, or OLDEN-BEAST, in allusion to its existence in the olden times; and DEFENCELESS BEAST, in allusion to the want of canine teeth in the genus it designates. Both genera belong to the Linnéan order of BELLUÆ or WARRIOR-BEASTS, and the Cuverian order of PACHYDERMATA or thick-skinned.

The station of the first is allotted in this order after the tapir, and before the rhinoceros and the horse, which gives us the best idea of its general character. It is generically distinguished by having forty-four teeth; in each jaw six foreteeth, two incisors, fourteen molars: snout extended, flexible; fore and hind-feet quadrifid.

The gypsum quarries alone have furnished five distinct species of this very singular animal, in a more or less perfect state of its skeleton. — 1. Palæotherium *magnum*, of the size of the horse. 2. P. *medium*, and 3. P. *crassum*, each of a size of the hog. 4. P. *curtum*, with decurtate, patulous feet. 5. P. *minus*, of the size of a sheep. Besides which, five other species have been discovered in other parts of France, imbedded in fresh water lime-stone, or in alluvial soil; one of them, P. *giganteum*, as large as the rhinoceros; and another, P. *tapiroides*, of the size of an ox.

The second species, or ANOPLOTHERIUM, is somewhat smaller, and has its station assigned between the rhinoceros or the horse on the one hand, and the hippopotamus, hog, and camel on the other. It has forty-four teeth in a continuous series; being, in each jaw, six fore-teeth; two incisors, not longer than the fore-teeth; fourteen molars; fore and hind feet bifid, with distinct metacarpal and metatarsal bones; and accessary digits in a few. This genus also offers four species, varying from the size of the horse or ass, to that of the leopard or elegant gazelle.

There is also another genus of entirely extinct quadrupeds, belonging to the same order, and of still larger magnitude, which M. Cuvier has been able to constitute, from remains found in different parts of the world, to which he has given the name of MASTODON. It makes a near approach to the elephant, and in one or two of its species vies with it in size. The ascertained species are five; the largest of which, called the great mastodon, has been found in considerable abundance near the river Ohio; and specimens of whose skeletons have been brought to our own country, and exhibited under the name of MAMMOTH, which, however, is an error; as mammoth is a Russian term, applied to a fossil species of genuine elephant, which we shall notice presently. But the mastodon has in America been confounded with the mammoth. Both have been dug up in the alluvial soil of

Siberia. Of the other species, two have been discovered by M. Humboldt in America alone; one both in America and at Simorre in Europe; and one both in Saxony and Montabusard. They are all of less magnitude than the great mastodon; and, from the character of the teeth, there is no doubt that all the species were grazing animals.

The fossil elephant, to which I have just referred, the proper mammoth of natural history, makes a nearer approach to the Asiatic than to the African living species; but it, nevertheless, differs so much from both, as to leave no question of its being an entirely extinct animal. Various relics of it, as bones and teeth, have been found scattered over almost every part of Europe, as well as in Asia and both Americas; occasionally in our own island, in the isle of Sheppey, and in Ireland. But they are more common, and in a far more perfect state, in Sweden, Norway, Poland, and especially in Asiatic Russia; and M. Cuvier inclines to a belief that the bones of archbishop Pontoppidan's giants of the north are nothing more than remains of this animal. The most perfect specimen of this kind that has ever been met with, was discovered in the year 1799, by a Tungusian fisherman. It appeared at this time like a shapeless mass, projecting from an ice-bank near the mouth of a river in the north of Siberia. Year after year a larger and a larger portion of the animal was rendered visible by the melting of the ice in

which it was embedded: but it was not till five years after the first detection that its enormous carcase became entirely disengaged, and fell down from an ice-crag upon a sand-bank, on the coast of the Arctic Ocean. The greater part of its flesh was soon afterwards devoured by the white bear, or cut away by the Juhuts of the neighbourhood, as food for their dogs; yet when, in 1806, Mr. Adams examined it on the spot, and carefully collected all its remaining parts, more than thirty pounds weight of its hair and bristles were gathered from the wet sand-bank into which they had been trampled; and the mass of extremely thick and heavy skin, which was still left, demanded the utmost exertions of ten men for its removal.

The other extinct animals of the same class and order, collected or described by M. Cuvier, are a fossil rhinoceros, sufficiently distinguished from the only two species at present known; two unknown species of the hippopotamus; and two of the tapir.

Of the fossil rhinoceros, the earliest specimens noticed were those described by Grew, and consist of bones dug out of alluvial soil near Canterbury. Since which period, other relics have been traced in various parts of Germany, France, and Italy; while, in Siberia, an entire animal has been discovered, with its flesh and skin little injured. Of the two developed species of fossil hippopotamus, there is a doubt whether the largest, found in the alluvial soil

of France and Italy, may not belong to an extant species; but the other, which is not larger than a hog, is strongly characterized, and widely different from either of the two living species of the present day. The two discovered species of fossil tapir evince a like difference of size, the one being small, the other gigantic: while both are found in different parts of France, Germany, and Italy.

All these belong to the pachydermatous or warrior-order of the mammal class, which may, perhaps, be regarded as the richest of all the divisions of fossil animals. But there is no class or order without like examples: and the caves of Gayleureuth, on the frontiers of Bayreuth, as examined by Esper, have furnished quite as extensive a variety as the quarries around Paris. He has hence derived two entirely extinct species of bear, one of the size of the horse; several species of the dog; one of the cat; and two of the weezel: all of which are possibly extinct, though there is a doubt respecting one or two of them. In these caves alone, indeed, according to M. Esper, the enormous mass of animal earth, the prodigious number of teeth, jaws, and other bones, and the heavy grouping of the stalactites, render the place a fit temple for the God of Death. Hundreds of cartloads of bony remains might be removed, and numerous bags be loaded with fossil teeth, almost without being missed.

The fossil deer and elk tribe form also a very

numerous collection. Among these the celebrated elk of Ireland, dug out of a marl-pit near Drogheda, with its antlers of nearly eleven feet from tip to tip, * figures as chief. The finest fallow-deer, red-deer, roes and stags, belonging to the fossil kingdom, have been found in Scania, Sommes, Etampes, Orleans, or scattered over Europe, in lime-stone, peat-bogs, or sand-pits. M. Cuvier has described seven distinct species, all of which, with the exception of one, are extinct or unknown species. Of the fossil ox, buffalo, and antelope genus, he has given four distinct species, all apparently unknown.

He has also collected fossil remains of the horse and hog genera, without being able to ascertain to what species they belong: and

* See Sir Thomas Molyneux's account of this animal in Phil. Trans. 1726.

This is the cervus *Eurycerus* of Dr. Hibbert: a name he has applied to it from Aldrovandus, who appears to have been acquainted with this species of fossil elk, and has referred to it as common at that time in various soils in the British isles. Specimens, indeed, are still often to be met with in this quarter: and Dr. Hibbert, in the essay now referred to, quotes part of a letter from Dr. Milligan, of Edinburgh, in which he adverts to the skeletons of three great elks that were lately dug up in Ireland, one of which measures eleven feet between the tips of the horns. And he adds, what would seem to show that this species had not been many ages extinct, that near them, in a three feet stratum of marl, were also found the skeletons of three dogs; and, at a little distance, several human skeletons. Edin. Journ. of Science, No. V. p. 134. 1825.

various animals of the order glires or gnawers, as beavers, guinea-pigs, and rabbits, and two decidedly unknown species of the sloth tribe, which he has distinguished by the names of Megalonix and Megatherium, the first as large as an ox, earliest discovered in lime-stone caves in Virginia in 1796; and the second of the size of the rhinoceros, hitherto found only in South America. Specimens of the ox-sized have since been found in Buenos Ayres, in Lima, and in Paraguay; and of these three the first, a perfect skeleton, was sent as a present to M. Cuvier by the Marquis Loretto in 1789.

Relics of fossil seals and lamantins, though less perfect than most of the preceding, enter also into this extraordinary collection.

In the other classes M. Cuvier has hitherto made less progress; though his collection of fossil, and apparently unknown amphibials, especially of the crocodile and tortoise tribes, is considerable and highly interesting; and should his life be spared for ten or twelve years longer, we may have reason to expect these classes to be filled up as numerously as that of mammals.

Among the most extraordinary of the fossil amphibials he has enumerated, is the gigantic monster first discovered as early as the year 1766, in the lime-stone quarries at Maestricht, and which was at that time regarded by some naturalists as a whale, by others as a crocodile, and by a third set as an enormous unknown fish. M. Cuvier has sufficiently ascertained that it

must have formed an intermediate genus between those animals of the lizard tribe which possess a long and forked tongue, and those with a short tongue and a palate armed with teeth; and it is hence generally regarded in the present day as a MONITOR, making an approach towards the crocodile. The length of the skeleton seems to have been about twenty-four feet: the head is a sixth part of the whole length of the animal, which is nearly the proportion it bears in the crocodile. The tail must have been very strong, and its width at the extremity have rendered it a most powerful oar, capable indeed of opposing any violence of the waters; and it is hence chiefly that M. Cuvier regards it as having been an inhabitant of the ocean: though we are hereby put into possession of a kind or species far surpassing in size and power any of those which it most nearly resembles, and at least rivalling the magnitude of the crocodile.*

* The fossil animals of this class have been since considerably enlarged by other discoveries; among the most curious of which, perhaps, are the Plesiosaurus of the late Mr. Conybeare, and the Megalosaurus of professor Buckland. The remains of the last are the most imperfect; though from a large portion of the lower jaw dug up from the soil at Stonesfield, near Oxford, and a thigh bone, found at Cuckfield, in Sussex, Mr. Buckland has been able to ascertain its mode of dentition, as also to estimate that its face must have terminated in a flat, straight, and very narrow snout. Its length seems to have been upwards of sixty feet, and its bulk to have equalled that of an elephant seven feet high. *Geol.* Trans. Series II. Vol. I, Part II.

The structure of this genus makes an approach to that of

The circumstances under which most of the preceding large and fossil animals have been found, and especially those traced in Siberia, afford sufficient proof that the catastrophe which arrested them must have overtaken them suddenly while in their native regions; and that they could not have been brought into their present situations from a remote distance. And we have hence facts to show, as we had occasion to observe formerly, that various quadrupeds of the largest size, as the elephant, mammoth, rhinoceros and hippopotamus, which are now traced in a living state in the hot parts of Asia, Africa, or America alone, formerly existed, as to certain species that have been long extinct, in the highest northern latitudes: and that consequently such species must have had such a discrepancy of habit and organization, like the dog and the ox tribes of our own day, as enabled them to endure the difference.

Such then is a brief sketch, I will not say of the animal kingdom, but of the most popular arrangements which have hitherto been attempted concerning it. It would have been much easier, and might have been much more interesting, to have extended the survey: but the

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fishes, but it has a length and flexibility of neck like that of the larger birds; and from the form of its paddles, it is probable that, like the crocodile, it swam on the surface of the ocean; an idea which is confirmed by various specimens found on the Dorsetshire coast, where the present writer has seen one or two nearly entire specimens.

thread of connection would then, probably, have escaped from us, and we should have lost the system in the fulness of the description.

Enough, however, and more than enough has, I trust, been offered to prove that the study of zoology is of a most interesting and inviting character, equally calculated to win the heart, and to inform the head. I have dwelt somewhat more at large upon the three lowest classes of worms, insects, and fishes, for the very reason that these classes have too often been passed over by naturalists, as little worthy of their attention; and because I wished to impress upon your minds, by the incontrovertible fact of living examples, that nothing is low, nothing little, nothing in itself unworthy in the view of the great Creator and common parent of the universe; that nothing lies beyond the reach of his benevolence, or the shadow of his protection. God alike supplies the wants and ministers to the enjoyments of every living creature: he alike finds them food in rocks and in wildernesses, in the bowels of the earth, and in the depths of the ocean. His is the wisdom that, to different kinds and in different ways, has adapted different habits and modes of being; and has powerfully endowed with instinct where he has strikingly restrained intelligence. It is he that has given cunning where cunning is found necessary, and wariness where caution is demanded; that has furnished with rapidity of foot, or fin, or wing, where such qualities appear expedient; and where might is of moment, has

afforded proofs of a might the most terrible and irresistible.

At the head of the whole stands man, the noblest monument of creative power "in this diurnal scene," and, in a state of purity and innocence, a faint image of the Creator himself; connected with the various classes of animals by his corporeal organization, but infinitely removed from them by the possession of an intelligent and immortal spirit; his chief distinction, to the external eye, consisting in the faculty of language, and the means of communicating and interchanging ideas: — a subject full of interest and of importance, and towards which, therefore, I shall beg leave to direct your attention after we have examined this lord of the universe in the different varieties he exhibits in different parts of the world, under the influence of climate, manner of life, and incidental circumstances.

> Thus nature varies: man, and brutal beast,
> And herbage gay, and scaly fishes mute,
> And all the tribes of heaven, o'er many a sea,
> Through many a grove that wing, or urge their song
> Near many a bank of fountain, lake or rill:
> Search where thou wilt, each differs in his kind,
> In form, in figure differs.*

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* Præterea genus humanum, mutæque natantes
Squamiferûm pecudes, et læta armenta, feræque,
Et variæ volucres, lætantia quæ loca aquarum
Concelebrant, circum ripas funtisque, lacûsque;
Et quæ pervolgant nemora avia pervolitantes;
Quorum unum quod vis generatim sumere perge,
Invenies tamen inter se differre figuris.
De Nat. Rer. II. 342.

LECTURE III.

ON THE VARIETIES OF THE HUMAN RACE.

Thus far we have confined ourselves to the different classes of animals below the rank of man. The sketch has been rapid and unfinished, but I hope not altogether unfaithful, or without its use. Let us now proceed to a general survey of the human species; the generic character by which man is distinguished from other animals, and the family character by which one nation is distinguished from another nation.

If we throw an excursive glance over the globe, and contemplate the different appearances of mankind, in different parts of it, and especially if we contrast these appearances where they are most unlike, we cannot but be struck with astonishment, and feel anxious for information concerning the means by which so extraordinary an effect has been produced. The height of the Patagonian and the Caffre is seldom less than six feet, and it is no uncommon thing to meet with individuals among them that measure from six feet seven to six feet ten: compared with these, the Laplanders and Eskimaux are real dwarfs; their stature seldom reaching five feet, and being more commonly only four.

Observe the delicate cuticle, and the exquisite rose and lilly that beautify the face of the Georgian or Circassian: contrast them with the coarse skin, and greasy blackness of the African negro, and imagination is lost in the discrepancy. Take the nicely-turned and globular form of the Georgian head, or the elegant and unangular oval of the Georgian face: compare the former with the flat skull of the Carib; and the latter with the flat visage of the Mogul Tartar, and it must, at first sight, be difficult to conceive that each of these could have proceeded from one common source. Yet the diversities of the intellectual powers are, perhaps, as great as those of the corporeal: though I am ready to admit, that for certain interested purposes of the worst and wickedest description, these diversities, for the last half century, have, even in our own country, been magnified vastly beyond their fair average, though the calumny has of late begun to lose its power.

The external characters thus glanced at, form a few of the extreme boundaries: but all of them run into each other by such nice and imperceptible gradations in contiguous countries, and sometimes even among the same people, as to constitute innumerable shades of varieties, and to render it difficult, if not impossible, to determine occasionally to what region an individual may belong when at a distance from his own home.

It has hence been necessary to classify the

human form; and the five grand sections, for we can no longer call them quarters, into which the globe is divided by the geographers of our own day, present us with a system of classification equally natural and easy: for in each of these sections we meet with a marked distinction, a characteristic outline that can never be mistaken, except in the few anomalies already adverted to, and which belong to almost every general rule; or in instances in which we can obviously trace an intermixture of aboriginal families.

Before we attempt, then, to account for these distinctions, let us endeavour, as briefly as possible, to point them out; and consider them under the five heads of the

EUROPEAN RACE;
ASIATIC RACE;
AMERICAN RACE;
AFRICAN RACE;
AUSTRALIAN RACE;

or as they are demoninated by M. Blumenbach, in his excellent work upon this subject,* the Caucasian, Mongolian, American, Ethiopian, and Malay varieties.

Gmelin has pursued the same general divisions, but has merely distinguished the respective races; and accordingly his five definitions

* De Generi Humani Varietate Nativâ.

are the white, brown, copper-coloured or red, black, and tawny man.

I. The most symmetrical, and therefore the most elegant variety of the human form, is that which I have called the EUROPEAN, in consequence of its being traced in the European division of the globe more largely than in any other; and the most perfect lineaments of this variety are those of the region of Asia Minor, on the borders of Europe, the parent spot from which it has been imported — lineaments which we find distributed amongst the Georgians, Circassians, Mingrelians, Armenians, Persians, and other nations that skirt the southern foot of the vast chain of the Caucasus. And it is on this account that M. Blumenbach has given the name of the CAUCASIAN variety to the European form in general. It is remarkable that in this spot of the globe man was first created: here he first received the breath of life, and arose in the image of his Maker. The die has not yet lost its divine impress: for here we still meet, and in all ages have met (so far as relates to the exterior graces) with the most exquisite models of symmetry and beauty.

The general colour of the EUROPEAN or GEORGIAN variety, the WHITE division of Gmelin, is fair; that of the cheeks more or less red; the head globular; the face straight and oval, with the features moderately distinct; the forehead sightly flattened; the nose narrow, and slightly aquiline; the cheek-bones unprominent; the

mouth small; the lips a little turned out, especially the under one; the chin full and rounded; the eyes and hair variable, but the former, for the most part, blue, and the latter yellow, or brown and flowing.

II. The colour of the ASIATIC, or MONGOLIAN, the BROWN-MAN of Gmelin, is yellowish brown or olive, with scarcely ever an appearance of red in the cheeks, which seems to be confined to the European variety; the head, instead of being globular, is nearly square; the cheek-bones wide; and the general face flat; the eyes are black and small; the chin rather prominent; and the hair blackish and scanty.

III. The AMERICAN, or RED-MAN of Gmelin, is of an obscure orange, rusty-iron, or copper-colour; the head is less square, the cheek-bones less expanded, and the face less flattened than in the Asiatic; the eyes are deeply seated; and the hair is black, straight, and thick. This variety seems to form a middle point between the European and the Asiatic.

IV. The colour of the AFRICAN, the ETHIOPIAN of Blumenbach, and BLACK-MAN of Gmelin, varies from a deep tawny to a pitch or perfect jet. The head is narrow; the face narrow, projecting towards the lower part; the forehead arched; the eyes projecting; the nose thick, almost intermixed with the cheeks; the lips, particularly the upper one, very thick; the jaws prominent; the chin retracted; the hair black, frizzled, and woolly. The countenance in this

variety recedes farther, than in any other, from the European, and approaches much nearer, than in any other, that of the monkey.

V. The AUSTRALIAN, or inhabitant of New South Wales, and the numerous clusters of islands that begirt that prodigious range of unexplored country, together with the South Sea Islands in general, constituting the MALAY of Blumenbach, and the TAWNY-MAN of Gmelin, is of blackish-brown, or mahogany colour: the head is somewhat narrowed at its upper part; the forehead somewhat expanded; the upper jaw slightly prominent; and the nose broad, but distinct; the hair harsh, coarse, long, and curly. This variety seems to form a middle point between the European and the African; as the American does between the European and the Asiatic. So that, in a more compendious view of the human race, we might contract the five varieties into three:—the European, Asiatic, and African; and regard the other two as mere intervening shades of variety.

In this general classification of mankind, however, there are two observations that are peculiarly worthy of attention. The first is, that although these distinctive characters will hold in the main, it is not to be expected that they will apply to every individual of the particular division to which they refer; nor that they belong so exclusively to such division as never to be traced, even by a natural introduction, among other divisions. The second is, that from

the restless or enquiring spirit of several of the divisions, and the migrations which have hence ensued, we ought to expect to meet occasionally with the distinctive characters of such divisions amongst other divisions, and in regions to which they do not naturally appertain.

A perfect jet of the skin has never, perhaps, been found in our own country, in any person of genuine English race; but a dark, swarthy, and even copper-colour is by no means uncommon; and an equal difference is observable in the globularity of the head, and the flatness or sharpness of the face. In like manner the skin is occasionally found fair among the red tribes of America*; and black among the tawny tribes of Australia, and even the olive nations of India. So Captain Cook informs us that, among the natives of the Friendly Islands, he saw hundreds of European faces, and not a few genuine Roman noses. And Adanson asserts that he was struck with the general beauty and proportion of several Senegambian females, in spite of their colour: while Vaillant and Le Maire give a similar testimony concerning the Caffre women, and the negresses of Gambia and Senegal.

The most enquiring and consequently the most migratory of the five divisions under which we are contemplating the race of man, is unques-

* See M. Humboldt; Essai Politique sur le Royaume de la Nouvelle Espagne. Paris, 1808—1809.

tionably the European. And hence we have reason to expect that we shall meet with more numerous establishments of the European form in regions to which it does not naturally belong than of any of the others. And experience confirms this expectation. It is, in truth, the migratory spirit of this peculiar division that has filled Europe itself; for, as I have already had occasion to remark, the division in its earliest state was confined to the southern foot of the Caucasus, and branched out into Europe from this region. And thus, in the west of Africa, extending from Fez to the Zaāra, we discover considerable patches of the same lineage, the progenitors of which have either shot through the isthmus of Suez or crossed the Mediterranean; while every one knows that, from a similar spirit of migration, America both North and South, and India in its southern promontory of the Deccan, have for several centuries past exhibited patches of a similar kind.

The Asiatic race, properly so called, have in like manner had their migrations; and hence we trace the form and features of this family, spreading southerly through the whole of Egypt and Abyssinia; northerly from the Imaus or Caff of the Caucasus towards the arctic boundaries of Europe and America, amidst the Laplanders and Nova Zemblians of the former, and the Greenlanders and Iskimos or (as we have it from the French writers) Esquimaux of the latter; and westerly from the north of Persia along the

banks of the Euxine, in successive waves, and chiefly under the different denominations of Fins, Goths, Alans, and Huns; the two last uniting on various occasions, and especially under the triumphant banners of Attila, and over-running great part of Germany, and consequently intermixing with the European race; at the same time driving the Fins into higher northern latitudes, along the shores of the Baltic, where they at length intermingled with the Laplanders. Amongst both these nations therefore, whether blended or separate, we still meet with very strong marks of the true, genuine Asiatic face, flat, wide, and of a sallow or olive hue; the eyes being small, and the hair dark and scanty.

It is probable, also, that the more polished nations of America, as the Toltecs and Mexicans that belong to the northern, and the Peruvians and Araucans that belong to the southern division of this continent, have originated from an Asiatic source. De Guignes, Forster, and Humboldt, concur in believing them to have been of Chinese or Japanese descent; while the mass of the numerous tribes that constitute the chief population of this continent, and are altogether distinguished in external and internal character from the preceding nations, seems to have issued, in various migrations, from some of the red or copper-coloured tribes with lank hair, which have of late years been traced in particular parts of Africa. It is also probable that Australia has in like manner been peopled

by successive waves of rovers from both these continents: for we trace proofs of both sources, sometimes separate, and sometimes mixt. But the theories that have been offered upon this subject are too numerous, and for the most part too fanciful for a minute detail, and belong rather to the geographer than to the physiologist.

There are some philosophers who have assigned several other distinctive characters to the different families of mankind than any thus far dwelt upon; and which are chiefly derived from the stature, the shape of a particular limb, or the intellect: thus the gigantic height of the Patagonian has been adverted to as a very prominent feature; the pigmy form of the Esquimaux; and the still more pigmy form of the Kimos of Madagascar, if any reliance may be placed on the testimony of Commerson, now that it has been corroborated by Modave, and still more lately by the Abbé de Rochon; the curved leg of the Calmuc race; the long leg of the Indian; and the high calf and flat foot of the Ethiopian. But it appears to me that all such distinctions are upon too narrow a scale, and perhaps too much dependent upon particular circumstances, for an admission into the lines of a broad and original demarcation. To the different powers of the intellect, which are still less to the point than even these corporeal peculiarities, I shall have occasion to advert presently.

Omitting, then, the consideration of these

subordinate points, whence have proceeded those striking and far stronger characteristics which we have noticed in the preceding divisions? Are the different distributions of man mere varieties of one common species, or distinct species merely connected under an imaginary genus? Has the human race proceeded from one source or from many?

In a country professing the Christian religion, and appealing to the records of Moses, as an established and veritable authority, I ought, perhaps, to blush at proposing such a question in public: but the insinuations which have in various ways been thrown out against this authority demand it, and I hasten to rescue, so far as I am able, the first and most interesting account we possess of the creation of man, from the philosophical doubts which have been thrown upon it, and to reconcile it with the natural history of man in our own day.

The Mosaic statement has met with two distinct classes of opponents, each of which has pretended to a different ground of objection. The one has regarded this statement as altogether untrue, and never intended to be believed: as a mere allegory or fiction; — a beautiful mythos often indulged in by other oriental writers in the openings of their respective histories; — as an enlivening frontispiece to a book of instruction. The other class has been in some degree more guarded in its attack; and has rather complained that the statement is inex-

plicit than that it is untrue. These last philosophers have found out that in its common interpretation it does not accord with the living volume of nature; and they hence contend that the common interpretation is incorrect; they perceive or think they perceive a variety of chasms in the sacred text which it is necessary to fill up before it can be made to harmonize with natural facts and appearances.

At the head of the former class stand the names of some of the first natural historians and scholars of modern times, as Linnéus, Buffon, Helvetius, Monboddo, and Darwin. And from whom do these philosophers, thus departing from the whole letter and spirit of the Mosaic history, pretend to derive the race of man? The four former from the race of monkeys; and the last, to complete the absurdity, from the race of oysters; for Dr. Darwin seriously conjectures that as aquatic animals appear to have been produced before terrestrial, and every living substance to have originated from a form or nucleus exquisitely simple and minute, and to have been perpetually developing and expanding its powers, and progressively advancing towards perfection, man himself must have been of the aquatic order on his first creation: at that time, indeed, imperceptible from his exility, but in process of years, or rather of ages, acquiring a visible or oyster-like form, with little gills, instead of lungs, and, like the oyster, produced spontaneously, without distinction into sexes; that, as reproduction

is always favourable to improvement, the aquatic or oyster mannikin, by being progressively accustomed to seek its food on the nascent shores or edges of the primæval ocean, must have grown, after a revolution of countless generations, first into an amphibious, and then into a terrestrial animal; and, in like manner, from being without sex, first also into an androgynous form, and thence into distinct male and female.*

It is not necessary to notice this dream of a poetizing philosopher, which had also been dreamt of long before his own day, any further than to remark that it is in every respect inferior to the opinion of two of the most celebrated schools of ancient Greece, the Epicurean and the Stoic; who, though they disagreed on almost every other point, concurred in their dogma concerning the origin of man; and believed him to have sprung, equally with plants and animals of every kind, from the tender soil of the new-formed earth, at that time infinitely more powerful and prolific; produced in myriads of little wombs that rose, like mole-hills, over the surface of the ground, and were afterwards transformed, for his nourishment, into myriads of glandular and milky bulbs, so as to form a marvellous substitute for the human-breast.

In the correct and elegant description of Lucretius, —

* See Temple of Nature, Cant. I. p. 26. 29., II. p. 54. IV. 158., and the additional notes on Spontaneous Vitality, and Reproduction.

Terra cibum pueris, vestem vapor, herba cubile
Præbebat, multa et molli lanugine abundans. *

Earth fed the nursling, the warm ether clothed,
And the soft downy grass his couch composed.

And frivolous as such a theory may appear in the present day, it was the only one which was current among the Grecian or Roman philosophers, except that which supposed mankind to have been propagated by eternal generation, and of course the universe, like himself, to be eternal and self-existent: compared with which, an origin from the dust of the earth, even after the manner of vegetables, is incomparably less monstrous and absurd.

Let us now pass on to the hypothesis of those modern philosophers who would associate the tribes of man with the tribes of the monkey, and originate both from one common stock, in the same manner as the ox and buffalo are said to be derived from the bison, and the different varieties of sheep from the argali.

There are a few wonderful histories afloat of wild men and wild women found in the woods of Germany and France; some of which are said to have been dumb, others to have had the voice of sheep or of oxen, and others again to have walked on all-fours. And from these few floating tales, not amounting, in modern times, to more than nine or ten, Linnéus thought proper to introduce the orang-otang into the human family,

* De Rer. Nat. v. 803.

and to regard such instances of wild men as the connecting species between this animal and mankind in a state of civilized society. Whence Lord Monboddo has amused us with legends of men found in every variation of barbarism; in some instances even ungregarious or solitary; in others, uniting, indeed, into small hordes, but so scanty even in natural or inarticulate language, as to be obliged to assist their own meaning by signs and gestures; and, consequently, to be incapable of conversing in the dark; of a third sort who have in some degree improved upon their natural language, but have still so much of the savage beast belonging to them, as to employ their teeth and nails, which last are not less than an inch long, as weapons of defence; and of a fourth sort, found in an island of the Indian Seas, with the full possession of speech, but with tails like those of cats or monkeys; a set of dreadful cannibals, which at one time killed and devoured every Dutchman they could lay their hands upon.

It is truly wonderful that a scholar of Lord Monboddo's accomplishments could have allowed himself to be for one moment imposed upon by a mass of trash so absurd and extravagant as not to be worth the trouble of confuting. Such romances are certainly in existence; but they are nothing more than the fabled news of a few low and illiterate mariners, whose names were never sufficient to give them the slightest degree of authority, even when they were first

uttered; and which, for the most part, dropped successively into an obscure and ignominious grave on the moment of their birth, and would have silently mouldered away into their elemental nothingness, had not this very singular writer chosen to rake up their decomposing atoms, in order to support an hypothesis which sufficiently proves its own weakness by the scouted and extravagant evidence to which it is compelled to appeal.

Of the wild men and wild women of Linnéus, some appear to have been ideots, escaped from their keepers; a few, exaggerated accounts of stray children from some wretched hovel of Lithuanian peasants; and one of them, a young negress, who during a shipwreck on the French coast, had swam on shore, and at once saved herself from death, and, what is worse than death, from slavery. She is said to have been found in the woods of Champagne, about the middle of the last century, and was at first exhibited under the name of *la fille sauvage* and *la belle sauvage;* and had the honour, soon afterwards, of being painted as a sign-post to one of our most celebrated inns in this metropolis, which is still known by the name of the *Bell Savage.* This young negress was instructed in the French language by the family into whose hospitable hands she fell, and was afterwards, from some unaccountable whim, denominated Mademoiselle LE BLANC.*

* See Monboddo on the Origin of Language, &c. vol. i. p. 193. 480.

In order, however, to settle this question completely, let me mention a few of the anatomical points in which the orang-otang differs from the human form, and which cannot possibly be the effect of a mere variety, but must necessarily flow from an original and inherent distinction. More might be added, but what I shall offer will be sufficient; and if I do not touch upon a comparison of the interior faculties, it is merely because I will neither insult your understandings nor degrade my own, by bringing them into any kind of contact.

Both the orang and pongo, which of all the monkey tribes make the nearest approach to the structure of the human skeleton, have three vertebræ fewer than man. They have a peculiar membranous pouch connected with the larynx or organ of the voice, which belongs to no division of man whatever, white or black. The larynx itself is, in consequence of this, so peculiarly constructed as to render it less capable even of inarticulate sounds than that of almost every other kind of quadruped: and, lastly, they have no proper feet; for what are so called, are, in reality, as directly hands as the terminal organs of the arms: the great toe in man, and that which chiefly enables him to walk in an erect position, being a perfect thumb in the orang-otang. Whence this animal is naturally formed for climbing: and its natural position in walking, and the position which it always assumes excepting when under discipline, is that of all-fours; the

body being supported on four hands, instead of on four feet as in quadrupeds. And it is owing to this wide and essential difference, as, indeed, we had occasion to observe in our last study, that M. Cuvier, and other zoologists of the present day, have thought it expedient to invent a new name by which the monkey and maucauco tribes may be distinguished from all the rest; and, instead of QUADRUPEDS, have called them QUADRUMANA, or QUADRUMANUALS; by which they are at the same time equally distinguished from every tribe of the human race, which are uniformly, and alone, BIMANUAL.

But throwing the monkey kind out of the question, as in no respect related to the race of man, it must at least be admitted, contend the second class of philosophers before us, that the wide differences in form, and colour, and degree of intellect, which the several divisions of mankind exhibit, as you have now arranged them, must necessarily have originated from different sources; and that even the Mosaic account itself will afford countenance to such a hypothesis.

This opinion was first stated, in modern times, by the celebrated Isaac Peyrere, librarian to the Prince of Condé; who, about the middle of last century, contended, in a book which was not long afterwards condemned to the flames, though for other errors in conjunction with the present, that the narration of Moses speaks expressly of the creation of two distinct species of man; — an elder species which occupied a part

of the sixth day's creation, and is related in the first chapter of Genesis; and a junior, confined to Adam and Eve, the immediate progenitors of the Hebrews to whom this account was addressed; and which is not referred to till the seventh verse of the second chapter, and even then without any notice of the exact period in which they were formed. After which transaction, observe this writer and those who think with him, the historian confines himself entirely to the annals of his own nation, or of those which were occasionally connected with it. Neither is it easy, they adjoin, to conceive, upon any other explanation, how Cain, in so early a period of the world as is usually laid down, could have been possessed of the implements of husbandry which belonged to him; or what is meant by the fear he expressed, upon leaving his father's family, after the murder of Abel, that every one who found him would slay him; or, again, his going forth into another country, marrying a wife there, and building a city soon after the birth of his eldest son.

Now, a cautious perusal of the Mosaic narrative will, I think, incontestably prove that the two accounts of the creation of man refer to one and the same fact, to which the historian merely returns, in the seventh verse of the second chapter, for the purpose of giving it a more detailed consideration; for it is expressly asserted in the fifth, or preceding verse but one, as the immediate reason for the creation of

Adam and Eve, that at that "time there was not a man to till the ground;" while, as to the existence of artificers competent to the formation of the first rude instruments employed in husbandry, and a few patches of mankind scattered over the regions adjoining that in which Cain resided, at the period of his fratricide, it should be recollected that this first fall of man by the hand of man, did not take place till a hundred and twenty-nine years after the creation of Adam: for it was in his one hundred and thirtieth year, that Seth was given to him in the place of Abel: an interval of time amply sufficient, especially if we take into consideration the peculiar fecundity of both animals and vegetables in their primæval state, for a multiplication of the race of man, to an extent of many thousand souls.

On such a view of the subject, therefore, it should seem that the only fair and explicit interpretation that can be given to the Mosaic history is, that the whole human race has proceeded from one single pair, or in the words of another part of the Sacred Writings, "that God hath made of ONE BLOOD all nations of men for to dwell on all the face of the earth."* The book of Nature, is in this, as in every other respect, in union with that of Revelation: it tells us that one single pair must have been adequate to all the purposes on which this class of philosophers

* Acts, xviii. 26.

have grounded their objections: and it should be further observed to them, that thus to multiply causes without necessity, is not more inconsistent with the operations of nature, than with the principles of genuine philosophy.

But the question still returns: whence, then, proceed those astonishing diversities among the different nations of mankind, upon which the arrangement now offered is founded?

The answer is, that they are the effect of a combination of causes; some of which are obvious, others of which must be conjectured, and a few of which are beyond the reach of human comprehension: — but all of which are common to other animals, as well as to man; for extraordinary as these diversities may appear, they are equally to be met with in the varieties of several other kinds of animals that can be proved to have been produced from a single species, and, in one or two instances, from a single pair.

The chief causes we are acquainted with are the four following: climate, food, manner of life, and hereditary diseases.

I. The influence which CLIMATE principally produces on the animal frame is on the colour of the skin and on the extent of the stature. All the deepest colours we are acquainted with are those of hot climates; and all the lightest those of cold ones. In our own country we perceive daily, that an exposure to the rays of the sun turns the skin from its natural whiteness to a deep brown or tan; and that a seclusion from the sun keeps it fair and unfreckled. In like manner

the tree-frog (rana *arborea*) while living in the shade is of a light yellow, but of a dark green when he is obliged to shift from the shade into the sun-shine. So the nereis *lacustris*, though whitish under the darkness of a projecting bank, is red when exposed to the sun's rays. And that the larves of most insects that burrow in the cavities of the earth, of plants, or of animals, are white, from the same cause, is clear, since being confined under glasses that admit the influence of solar light, they exchange their whiteness for a brownish hue.

The same remark will apply to plants as well as to animals; and hence nothing more is necessary to bleach or whiten them, than to exclude them from the light of day. Hence the birds, beasts, flowers, and even fishes of the equatorial regions, are uniformly brighter or deeper tinctured in their spots, their feathers, their petals, and their scales, than we find them in any other part of the world. And hence, one reason at least for the deep jet which, for the most part, prevails among mankind under the equator; the dark-brown and copper-colours found under the tropics; and the olive, shifting through every intermediate shade to the fair and sanguine complexion, as we proceed from the tropic of Cancer northwards. Hence, too, the reason why the Asiatic and African women, confined to the walls of their seraglios, are as white as Europeans; why Moorish children, of both sexes, are, at first, equally fair, and why the fairness con-

tinues among the girls, but is soon lost among the boys.

As we approach the poles, on the contrary, we find every thing progressively whiten; bears, foxes, hares, falcons, crows, and blackbirds, all assume the same common livery; while many of them change their colour with the change of the season itself. For the same reason, as also because they have a thinner mucous web, the Abyssinians are less deep in colour than the negro race; for though their geographical climate is nearly the same, their physical climate differs essentially: the country stands much higher, and its temperature is far lower.

The immediate matter of colour, as I had occasion to observe more fully in a preceding lecture, is the mucous pigment which forms the middle layer of the general integument of the skin; and upon this, the sun, in hot climates, appears to act in a twofold manner; first, by the direct affinity of its colorific rays with the oxygene of the animal surface, in consequence of which the oxygene is detached and flies off; and the carbone and hydrogene being set at liberty, form a more or less perfect charcoal according to the nature of their union; and next, by the indirect influence which its calorific rays, like many other stimulants, produce upon the liver, by exciting it to a secretion of more abundant bile, and of a deeper hue. I have formerly remarked that this second or colouring layer of the general

integument of the skin, differs (as indeed all the layers of the skin do) in their thickness, not only in different kinds of animals, but very frequently in different species, varieties, and even individuals. Thus in our own country we find it more abundant in some persons than in others; and wherever it is most abundant, we find the complexion also of a darker and coarser, and greasier appearance, upon a common exposure to the solar light and heat: and we find also, that the hair is almost uniformly influenced by such increase of colour, and is proportionally coarser and darker.

It is of some consequence to attend to this observation; for it may serve to explain a physiological fact that has hitherto been supposed of difficult elucidation.

A certain degree of heat, though less than that of the tropics, appears favourable to increase of stature; and I have already observed, that the tallest tribes we are acquainted with are situated at the back of Cape Horn, and the Cape of Good Hope. On the contrary, the most diminutive we are acquainted with are those that inhabit the coldest regions or the highest mountains in the world: such are the Laplanders and Nova Zemblians in Europe, the Samoieds, Ostiacs and Tungooses in Asia, and the Greenlanders and Eskimaux in America. Such, too, are the Kimos of Madagascar, if the account of these pigmy people may be depended upon, whose native region is stated to be the central and highest

tracts of the island, forming, according to Commerson, an elevation of not less than sixteen or eighteen hundred fathoms above the level of the sea.

A multitude of distinct tribes have of late years been discovered in the interior of Africa, in the midst of the black tribes, exhibiting nothing more than a red or copper hue, with lank black hair. And, in like manner, around the banks of the Lower Orinoco, in Mexico, where the climate is much hotter, there are many clans of a much lighter hue than those around the banks of the Rio Negro, where it is much cooler; and M. Humboldt has hence ventured to assert that we have here a full proof that climate produces no effect upon the colour of the skin. Such an assertion, however, is far too hasty; for he should first have shown that the thickness of the mucous web or colouring material is equally abundant in all these instances. For if it be more abundant (as it probably is) in the tribes that are swarthiest, we have reason to expect that a swarthier colour will be found where there is an equal or even a less exposure to solar light and heat; and we well know that the hair will vary in proportion.*

II. The effects of DIFFERENT KINDS OF FOOD upon the animal system are as extensive and as

* See Essai Politique sur la Nouvelle Espagne, par Alexandre de Humboldt, &c. pp. 84, 85. 4to. Paris, 1808, 1809.

wonderful as those of different climates. The fineness and coarseness of the wool or hair, the firmness and flavour of the flesh, and in some degree the colour of the skin, and extent of the stature, are all influenced by the nature of the diet. Oils and spirits produce a peculiar excitement of the liver; and like the calorific rays of the sun, usually become the means of throwing an overcharge of bile into the circulation. Hence the sallow and olive hue of many who unduly addict themselves to vinous potation, and who at the same time make use of but little exercise. And hence also the dark and dingy colour of the pigmy people inhabiting high northern latitudes, to whom we have just adverted, and whose usual diet consists of fish and other oils, often rancid and offensive. Though it must be admitted that this colour is in most instances aided by the clouds of smoke in which they sit constantly involved in their wretched cabins, and the filth and grease with which they often besmear their skins. And hence also one cause of their diminutive stature; the food they feed on being unassimilating and innutritive. Swine and all other animals fed on madder-root, or that of gallium *verum*, or yellow-ladies-bed-straw, have the bones themselves tinged of a deep red, or a yellow; and M. Huber of Lausanne, who has of late years made so many valuable discoveries in the natural habits of the honey-bee, has proved himself able by a difference in the food alone, as indeed Debraw had

done long before him *, to convert what is commonly, but improperly, called a neuter into a queen bee.

III. It would be superfluous to dwell on the changes of body and perceptive powers produced in the animal system, by a DIFFERENCE IN THE MANNERS AND CUSTOMS. We have the most striking proofs of this effect in all the domesticated animals by which we are surrounded. Compare the wild horse with the disciplined; the bison with the ox, which last is usually regarded as the bison in a state of tameness; and the Siberian argali with the sheep which is said to have sprung from it. Compare the modern Romans with the ancient; the low cunning and servile temper of too many of the Greek tribes of the present day, that still bend to and kiss the Ottoman rod, with the noble courage and patriotic enthusiasm of their forefathers, who drove back the tyrant of Persia and his million of men across the Hellespont, and dashed to pieces the proud bridge with which he boasted of having conquered the billows.

It is in reality from long and deeply rooted habit alone that the black, red, and olive colour of the Ethiopian, American, and Moguls, is continued in the future lineage for so many generations after their removal into other parts of the world; and that nothing will, in general, restore the skin to its original fairness

* See Phil. Trans. for 1777, p. 15.

but a long succession of intermixtures with the European variety. It is a singular circumstance that the black colour appears to form a less permanent habit than the red or olive; or in other words, the colour chiefly produced by the action of the sun's colorific rays, than that produced by the action of its calorific rays: for the children of olive and copper-coloured parents exhibit the parental hue from the moment of birth; but in those of blacks it is usually six, eight, or ten months before the black pigment is fully secreted. We also sometimes find this not secreted at all, whence the anomaly of white negroes: and sometimes only in interrupted lines or patches, whence the anomaly of spotted negroes; and we have even a few rare cases of negroes in America who, in consequence of very severe illness, have had the whole of the black pigment absorbed and carried off, and a white pigment diffused in its stead. In other words, we have instances of a black man being suddenly bleached into a white man. These instances are indeed of rare occurrence: but they are sufficient to show the absurdity of the argument for a plurality of human stocks or species, from a mere difference in the colour of the skin; an argument thus proved to be altogether superficial, and which we may gravely assert to be not more than *skin-deep*.

It is in consequence of this power in the system, of secreting a dark-coloured pigment under particular circumstances that we not un-

frequently see the skin of very fair women, when in a state of pregnancy, changed to a deep tawny, and almost to a black; and it is hence that the black pigment of the eye is perpetually maintained and replenished. *

Dr. Wells gave a paper to the Royal Society, which was read April 1, 1813, containing an account of a woman (Harriet Tresh) "whose left shoulder, arm, and hand, are as black as the blackest African's, while all the rest of the skin is very white. She is a native of Sussex, and the cause she assigns is, that her mother set her foot upon a lobster during her pregnancy." So that we have not only instances of blacks being suddenly bleached, but of whites being made more or less black. In like manner, confined birds sometimes become wholly black; and are said to become so occasionally in the course of a single night. So the male kestrel, from being barred on the tail feathers, becomes wholly ash-coloured except at the end; and the heron, gull, and others, whose tail is white when matured, are for the first two years mottled.

IV. But it is probable that a very great part of the more striking distinctions we have noticed, and almost all the subordinate variations occasionally to be met with, are the result of a MORBID AND HEREDITARY AFFECTION. The vast influence which this recondite but active cause possesses over both the body and the mind, are

* Camper's Lect. on Comp. Anat. in regard to the Art of Drawing.

known in some degree to every one from facts that are daily presenting themselves to us. We see gout, consumption, scrophula, leprosy, propagated on various occasions, and madness and fatuity, and hypochondriacal affections as frequently. Hence the unhappy race of Albinoes; and whole pedigrees of white negroes; hence the pigmy stature of some families, and the gigantic size of others.

Even when accident, or a cause we cannot discover, has produced a preternatural conformation or defect in a particular organ, it is astonishing to behold how readily it is often copied by the generative principle, and how tenaciously it adheres to the future lineage. A preternatural defect of the hand or foot has been propagated for many generations, and has in numerous instances laid a foundation for the family name. The names of Varus and Plautus among the ancient Romans afford familiar exemplifications. Hence, hornless sheep and hornless oxen produce an equally hornless offspring; the broad-tailed Asiatic sheep yields a progeny with a tail equally monstrous, and often of not less than half a hundred pounds' weight; and dogs and cats with mutilated tails not unfrequently propagate the casual deficiency.

There is a very peculiar variety of the sheep kind given in the Philosophical Transactions for 1813, by Colonel Humphreys of America, and which the American naturalists have called, from its bowed or elbowy legs, ovis *Ancon:* but the

common people "the otter-breed," from its resemblance to the general form of the otter, and a rumour that it was at first produced by an unnatural intercourse between individuals of the two distinct kinds. Its size is small; the full weight being about 45lb. with loose articulations, crooked fore-legs, and great feebleness of power; whence it walks with difficulty, and is therefore quiet and not fond of rambling. Accident seems to have produced this kind first, but the form has been most correctly preserved in the progeny; and so tenaciously, that if a common sheep and ancon sheep of either sex unite, the young will be either a perfect ancon, or have no trace of it; and if two are lambed at the same time, and one be of one variety and the other of the other, each is found to be perfect in its way, without any amalgamation.

In like manner, in all probability, from some primary accident resulted the peculiar shape of the head and face in most nations as well as in most families; and hence too those enormous prominences on the hinder parts of one or two of the nations at the back of the Cape of Good Hope, of which an instance was not long since exhibited in this country with some degree of outrage on moral feeling.

Man, then, is not the only animal in which such variations of form and feature occur; nor the animal in which they occur either most frequently or in the most extraordinary and extravagant manner.

M. Blumenbach, who has pursued this interesting subject with a liveliness the most entertaining, and a chain of argument the most convincing, has selected the swine genus from among many other quadrupeds that would have answered as well, especially the dog and the sheep, in order to institute a comparison of this very kind; and he has completely succeeded in showing that the swine, even in countries where we have historical and undeniable proofs, as especially in America, of its being derived from one common and imported stock, exhibits, in its different varieties, distinctions not only as numerous and astonishing, but, so far as relates to the exterior frame, of the very same kind as are to be met with in the different varieties of the human species.

In regard to size the Cuba swine, well-known, as he observes, to have been imported into that island from Europe, are at the present day double the height and magnitude of the stock from which they were bred. Whence we may well laugh at every argument in favour of more than one human stock or species drawn from the difference of stature in different nations of man. In regard to colour they display at least as great a diversity. In Piedmont the swine are black; in Bavaria reddish-brown; in Normandy white. Human hair, observes M. Blumenbach, is somewhat different from swine's bristles; yet in the present point of view they may be compared with each other. Fair hair is soft, and

of a silky texture; black hair is coarser, and often woolly. In like manner, among the white swine in Normandy, the bristles on the body are longer and softer than among other swine; and even those on the back, which are usually stouter than the rest, are flaccid and cannot be employed by the brush-makers.

The whole difference between the cranium of a Negro and that of an European is in no respect greater than that which exists between the cranium of the wild boar and that of the domestic swine. Those who are in possession of Daubenton's drawings of the two, must be sensible of this the first moment they compare them together. The peculiarity among the Hindus of having the bone of the leg remarkably long, meets a precise parallel in the swine of Normandy, which stand so high on their hind quarters, that the back forms an inclined plane to the head; and as the head itself partakes of the same direction, the snout is but a little removed from the ground.

In some countries, indeed, the swine have degenerated into races that in singularity far exceed the most extravagant variations that have been found among the human species. What can differ more widely than a cloven foot and a solid hoof? yet swine are found with both: the variety with a solid hoof was known to the ancients, and still exists in Hungary and Sweden: and even the common sort that were carried by the Spaniards to the isle of Cuba, in 1509, have

since degenerated into a variety with a hoof of the same solid kind, and of the enormous size of not less than half a span in diameter.

How absurd, then, to contend that the distinctions in the different varieties of the human race must have proceeded from a plurality of species, while we are compelled to admit that distinctions of a similar kind, but more numerous and more extravagant, have proceeded from a single species in other animals!

It may appear singular, perhaps, that I have taken no notice of the wide difference which is supposed to exist in the intellectual faculties of the different varieties of man. To confess the truth, I have purposely omitted it, because of all the arguments that have ever been offered to support the doctrine of different species, this appears to me the feeblest and most superficial. It may suit the narrow purpose of a slave merchant,—of a trafficker in human nerves and muscles,—of a wretch, who, in equal defiance of the feelings and the laws of the day, has the impudence to offer for sale on the polluted shores of our own country, in one and the same lot, as was the case not long since, a dead cameleopard and a living Hottentot woman:—it may suit their purpose to introduce such a distinction into their creed, and to let it constitute the whole of their creed, but it is a distinction too trifling and evanescent to claim the notice of a physiologist for a moment.

The variable talents of the mind are as propa-

gable as the variable features of the body, — how, or by what means, we know not, — but the fact is incontrovertible. Wit and dulness, genius and idiotism, run in direct streams from generation to generation; and hence the moral character of families, of tribes, of whole nations. The understanding of the Negro race, it is admitted, is in many tribes strikingly and habitually obtuse. It has thus, indeed, been propagated for a long succession of ages; and till the Negro mind receives a new turn, till it becomes cultivated and called forth into action by some such benevolent stimulus as that which is now abroad generally, and especially such as is afforded it by the African Institution of our own country, (an establishment that ought never to be mentioned without reverence,) the same obtuseness must necessarily continue, and by a prolongation of the habit, may, perhaps, even increase. But let the man who would argue from this single fact, that the race of Negroes must be necessarily an inferior species, distinct from all the rest of the world, compare the taste, the talents, the genius, the erudition, that have at different periods blazed forth in different individuals of this despised people, when placed under the fostering providence of kindness and cultivation, with his own or those of the generality of his own countrymen, and let him blush for the mistake he has made, and the injury he has committed.

Freidig, of Vienna, was an excellent architect,

and a capital performer on the violin; Hannibal was not only a colonel of artillery in the Russian service, but deeply skilled in the mathematical and physical sciences; so, too, was Lislet, of the Isle of France, who was in consequence made a member of the French academy; and Arno, who was honoured with a diploma of doctor of philosophy by the university of Wirtemberg, in 1734. Let us add to these the names of Vasa and Ignatius Sancho, whose taste and genius have enriched the polite literature of our own country: and, with such examples of Negro powers before us, is it possible to do otherwise than adopt the very just observation of a very quaint orator, who has told us that the "Negro, like the white man, is still God's image, although carved in ebony?"

Nor is it to a few casual individuals among the black tribes, appearing in distant countries, and at distant æras, that we have to look for the clearest proofs of human intelligence. At this moment, scattered like their own oases, their islands of beautiful verdure, over the eastern and western deserts of Africa, multitudes of little principalities of Negroes are still existing,—multitudes that have, of late years, been detected and are still detecting, whose national virtues would do honour to the most polished states of Europe: while at Timbuctoo, stretching deepest towards the east of these principalities, from the western coast, we meet, if we may credit the accounts we have received, with one of the

wealthiest, perhaps one of the most populous and best governed cities in the world; its sovereign a Negro, its army Negroes, its people Negroes; a city, which is the general mart for the commerce of western Africa, and where trade and manufactures seem to be equally esteemed and protected.*

* I follow Mr. Jackson's description, which is added to his "Account of the Empire of Marocco," as by far the most circumstantial and authoritative we have hitherto received. According to him "the city is situated on a plain, surrounded by a sandy eminence, about twelve miles north of the Nile El Abeade, or Nile of the Blacks; and three days' journey (erhellat) from the confines of Sahara; about twelve miles in circumference, but without walls. The town of Kabra, situated on the banks of the river, is its commercial depôt or port. The king is the sovereign of Bambarra: the name of this potentate, in 1800, was Woolo: he is a black, and a native of the country he governs. His usual place of residence is Jiunie, though he has three palaces in Timbuctoo, which are said to contain an immense quantity of gold."—The present military appointments are, it seems, entirely from the Negroes of Bambarra: the inhabitants are also, for the most part, Negroes, who possess much of the Arab hospitality, and pride themselves in being attentive to strangers. By means of a water-carriage, east and west of Kabra, great facility is given to the trade of Timbuctoo, which is very extensive, as well in European as in Barbary manufactures. The various costumes, indeed, exhibited in the market-places, and in the streets, sufficiently indicate this, each individual being habited in the dress of his respective country. There is a perfect toleration in matters of religion, except as to Jews. The police is extolled as surpassing any thing of the kind on this side the Desert: robberies and house-breaking are scarcely known. The government of the city is entrusted to a divan of twelve slemma or magistrates; and the civil jurisprudence superintended by a learned Cadi.

We know not the antiquity of this kingdom: but there can be no doubt of its having a just claim to a very high origin: and it is possible that, at the very period in which our own ancestors, as described by Julius Cæsar, were naked and smeared over with paint, or merely clothed with the skins of wild beasts, living in huts, and worshipping the misletoe, the black kingdom of Bambarra, of which Timbuctoo is the capital, was as completely established and flourishing as at the present moment.

What has produced the difference we now behold? What has kept the Bambareens, like the Chinese, nearly in a stationary state for, perhaps, upwards of two thousand years, and has enabled the rude and painted Britons to become the first people of the world — the most renowned for arts and for arms — for the best virtues of the heart, and the best faculties of the understanding? Not a difference in the colour of the skin; — but, first, the peculiar favour of the Almighty: next, a political constitution, which was sighed for, and in some degree prefigured by Plato and Tully, but regarded as a masterpiece, beyond the power of human accomplishment: and, lastly, a fond and fostering cultivation of science, in every ramification and department.

Amidst the uproar and ruin of the world around us, these are blessings which we still possess; and which we possess almost exclusively.* Let us prize them as they deserve; let

* The lecture was delivered in 1812.

us endeavour to be worthy of them. To the great benefit resulting from literature, and mental cultivation, the age is, indeed, thoroughly awake; and it is consolatory to turn from the sickening scenes of the continent, and fix the eye in this point of view upon our own native spot; to behold the ingenuous minds of multitudes labouring with the desire of useful knowledge; to contemplate the numerous temples that are rising all around us, devoted to taste, to genius, to learning, to the liberal arts; and to mark the generous confederacies by which they are supported and embellished.

In this little school of philosophy, surrounded by walls that were once enriched with the choicest collections, and the rarest curiosities of nature*, but which, from a concurrence of adverse circumstances, must have fallen into ruins, had not you, with laudable patronage, interposed, re-decorated the sinking edifice, and made it once more echo to the voice of instruction and study; — here, where the genius of Science has resumed the possession of his simple throne, and is once more thronged by a numerous train of attentive votaries — here more especially may I address these observations without incurring the charge of rhapsody or extravagance. — Long may so promising an Institution flourish! soundly may it be cultivated! and of sterling value be the harvests that it produces!

* Formerly celebrated as the Leverian Museum, and erected for that purpose.

LECTURE IV.

ON INSTINCT.

THERE are various actions, and trains of actions, occasionally to be met with among mankind, but more frequently and more strikingly among other animals, which indicate the employment of definite means to obtain a definite end, without the intervention of that chain of thought which characterises *reason*, and which have hence been ascribed to a distinct principle, that has been distinguished by the name of *instinct*.

Such, in the new-born infant, and indeed in the young of all mammalian animals, is the act of hunting out for the mother's milky food, and of sucking with a perfection which can never be acquired in subsequent life. Such is the whole process of nestling or nidification among birds; the periodical change of salt for fresh water among the sturgeon, salmon, and other fishes; and, among insects, the formation of the exquisite decoy-lines of the spider, and the nice masonry of the bee, and of the termes *bellicosus* or white ant.

The common fact admits of no dispute; the modes of accounting for it have been various, and in the utmost degree unsatisfactory. In a

general survey they may be resolved into three classes: first, those hypotheses which ascribe the whole to the operation of body alone; secondly, those which ascribe it to mind alone; and, thirdly, those which derive it from a substance of a mediate nature between the two, or attribute it partly to the one and partly to the other.

In pursuing this highly interesting subject, I shall first briefly notice the principal opinions which have been offered upon it, in the order thus laid down, and point out their irrelevancy: and then propose a new theory, and explain the grounds upon which it is founded.

I. It was the opinion of Des Cartes that brutes are mere mechanical machines: that they have neither ideas nor sensation; neither pain nor pleasure; and that their outcries under punishment, and their alacrity in pursuing an enemy or devouring a meal are produced by the very same sort of force, which, exerted upon the different keys of an organ, compels its respective pipes to give forth different sounds. And a great part of the cardinal Polignac's very elegant Latin poem, entitled Anti-Lucretius, is written in direct support of this most whimsical hypothesis. I shall, perhaps, have occasion to examine it somewhat more at large in a subsequent study: for the present it may be sufficient to observe that, in spite of all the philosophy in the world, the coachman to this hour has whipped, and will yet continue to whip

his horses, the huntsman to halloo his hounds, and the bird-trainer to sing or whistle to his bull-finches: though if the whole were mere mechanical machines, they might as well whip the sands, halloo to the waves, and whistle to the winds.

Under this view of the subject all instinctive actions were of course referred to a principle of body, or gross tangible matter, not endowed with peculiar or exclusive properties; and wherever any thing of the same description was to be found among mankind, it was instantly separated from all connexion with intelligence, and referred to the same source.

The incongruities accompanying this hypothesis have not, however, prevented other philosophers from following it to a certain latitude in modern times, although it has been seldom, perhaps never of late days, pursued to the extent contended for by Des Cartes. The ideas of Dr. Reid, who has expressly written upon this subject, do not appear to be very perspicuous: yet he obviously espouses the doctrine of a mechanical principle of animal actions: and the actions which are resolvable into this principle are, in his opinion, of two kinds, those of instinct, and those of habit. Instinct is with him, therefore, as well as with Des Cartes, a property of body or gross matter alone, unendowed with any peculiar powers, and merely operated upon by a combination of mechanical forces.

II. In direct opposition to this corporeal hypothesis, Mr. Smellie and Dr. Darwin have contended that instinct is altogether a mental principle, the brute tribes possessing an intelligent faculty of the very same nature as mankind, though more limited in its range. From this point, however, these two physiologists disagree, and fly off in opposite directions: the former contending that reason is the result of instinct*, and the latter that instinct is the result of reason. In the promptitude and perfection with which the new-born infant seeks out and sucks its mother's breast, Dr. Darwin asserts that, although

* Mr. Smellie defines instinct to be "every original quality of mind *which produces feelings or actions*, when the proper objects are presented to it:"— Philos. of Nat. Hist. vol. i. p. 155. So, p. 159, "From the above facts and reasonings, it seems to be apparent that instincts are original qualities of mind; that every animal is possessed of some of these qualities; that the intelligence and resources of animals are proportioned to the number of instincts with which their minds are endowed; that all animals are, in some measure, *rational beings*; and that the dignity and superiority of the human intellect are necessary results, not of the conformation of our bodies, but of the great variety of instincts which nature has been pleased to confer on the species."

In p. 156, he in like manner confounds mind with sensation, as he has above confounded instinct with mind. "Sensation," says he, "implies a sentient principle or mind. Whatever feels, therefore, is mind. Of course, the lowest species of animals are endowed with mind." It ought to have been first proved that the lowest species of animals are even endowed with sensation.

the chain of thought which directs it to the accomplishment of its object, is concealed from the view, it still exists; and he endeavours to follow it up and develope it*; in which, however, it is not worth while to accompany him, for the whole process, even upon his own showing, is so complex, that it would rather require the genius of an adult Newton to unfold it, than yield to the dawning powers of a new-born infant.

I will just observe, that in various cases of the instinctive faculty the most excursive theorist cannot picture to his imagination any thing like a chain of thought, or previous reasoning; any thing like habit or imitation, by which the means and the end are joined together. Let us take, as an example, the very common instance of a brood of young ducks brought up under a hen, and contrary to all the instincts and feelings of the foster-mother, plunging suddenly into the

* "By a due attention to these circumstances, many of the actions, which at first sight seemed only referable to an *inexplicable instinct*, will appear to have been acquired, like *all other animal actions that are attended with consciousness, by the repeated efforts of our muscles under the conduct of our sensasions or desires*:" — Zoonom. Lect. xvi. 2. 4. "If it should be asked, what induces a bird to sit weeks on its first eggs, unconscious that a brood of young ones will be the product? the answer must be, that it is the same passion that induces the human mother to hold her offspring whole nights and days in her fond arms, and press it to her bosom, unconscious of its future growth to sense and manhood, till observation or tradition have informed her."— Darwin, Sect. xvi. 13. 4.

water, while she herself trembles piteously on the brink of the pond, not daring to pursue them, and expecting every moment to see them drowned. By what kind of experience or observation, by what train of thought or reasoning has the scarcely fledged brood been able to discern that a web-foot fits them for swimming, and that a fissured foot would render them incapable? — a knowledge that mankind have only acquired by long and repeated contemplation, and which has never been fully explained to this hour. Habit, imitation, and instruction, would all concur in teaching them to flee from the water, as a source of inevitable destruction: and yet in opposition to all these influences and premonitions, we see them rush into it, and harmlessly: we see them obeying an irresistible impulse, which directs them to what is fitting, stamped in the interior of their little frames, and which is equally remote from the laws of mind and of mechanism.

In like manner, by what process of imitation, education, or reasoning, does the nut-weevil (curculio *nucum*) seek out exclusively, and with the nicest knowledge of the plant, the green hazel in the month of August, whilst its nut-shell is yet soft and easily penetrable? What past experience or course of argument instructs her that this is the fruit best adapted, or perhaps only adapted, to the digestive powers of her future progeny? With a finished knowledge of her art, as soon as she is prepared to deposite her eggs, she singles out a nut, pierces it with

her proboscis, and then, turning round accurately, drops an egg into the minute perforation; having accomplished which, she passes on, pierces another nut, drops another egg, and so continues till she has exhausted her entire stock. The nut, not essentially injured, continues to grow. The egg is soon hatched; the young larve or maggot finds its food already ripened and in waiting for it; and about the time of its full growth, falls with the mature nut to the ground, and at length creeps out by gnawing a circular hole in the side. It then burrows under the surface of the ground, where it continues dormant for eight months, at the termination of which time it casts its skin, commences a chrysalis of the general shape and appearance of the beetle kind, and in the beginning of August throws off the chrysalid investment, creeps to the surface of the ground, finds itself accommodated with wings, becomes an inhabitant of the air, and instantly pursues the very same train of actions to provide for a new progeny which had been pursued by the parent insect of the year before.

In all such cases it is clear that there is a principle implanted in the living form equally distinct from all mechanical, chemical, and rational powers, which directs the agent by an unerring impulse, or in other words, impels it by a prescribed and unerring law, to accomplish a definite end by a definite mean.

Such instinctive powers are not only allowed

upon Mr. Smellie's hypothesis, but are conceived to be almost innumerable; and reason, instead of giving birth to them, is in his opinion, as I have already observed, the general result of them, and consists in the power of comparing one instinct with another, and assenting to those that preponderate. According to this hypothesis, all the actions of the involuntary organs of the body are so many instincts, as pulsation, digestion, secretion; all natural feelings are so many instincts, as love of life, dread of death, and the desire of progeny; all the passions are so many instincts, as fear, hope, envy, benevolence, reverence, superstition, devotion; and hence life is nothing more than a bundle of instincts *; and reason, which is itself founded upon an instinctive principle, consists, as I have just observed, of nothing more than a power or tendency to compare the different strengths of these antagonist forces whenever they are brought into a state of action, and to be guided by those that are prepollent; or that offer what is felt or conceived to be the best means of obtaining a proposed end. The objections to which this hypothesis is exposed, or rather the evils chargeable upon it are innumerable; but it is sufficient to observe, at present, that it as effectually confounds the separate faculties of instinct and reason as the preceding hypothesis of Dr. Darwin, and consequently that neither of the two opinions

* Transact. of the Royal Society of Edinb. vol. v. p. 39.

are in any respect more admissible than those which refer the instinctive faculty to a mechanical principle, or, in other words, to the common properties of unorganized matter.

III. There is a third class of philosophers who, sensible of the difficulty of the case, have endeavoured to get over it by contending that instincts are of a mixed kind: that they either originate in a power which holds an intermediate nature between matter and mind; or else are in some instances simply material, and in others simply mental.

The very excellent and learned Cudworth belonged to the first of these two divisions, and may be regarded as having taken the lead in the scheme which it developes. I have already observed, in a former study, that this profound metaphysician was so strongly attached to the Platonic theory of the creation of the world, that he strove, with the full force of his mighty mind, to restore this theory to general vogue. And as it was one important principle in this theory that incorporeal form, or an active and plastic nature, exists throughout the world independently of pure mind and pure matter, and that the last is solely rendered visible and endowed with manifest properties by an union with this active intermede, Cudworth conceived that all instinctive powers might be satisfactorily resolved into the operation of the same secondary energy in proportion as it pervades the universe.*

* Intellect. Syst. 1743.

In opposition to which doctrine, however, it is sufficient to remark that, as the existence of all visible matter, whether organized or unorganized, upon the leading principle of the Platonic theory, is equally the result of this plastic power, and produced by an union with it, it should follow that unorganized matter ought occasionally at least to give proofs of an instinctive faculty, as well as matter in an organized state; proofs of definite means to accomplish a definite end, and that end the general weal, preservation, or reproduction of the body exhibiting it. But as, by the common consent of all mankind, no such faculty is ever to be traced in unorganized matter, it cannot be referred to a principle which is equally common and essential to all visible matter, whether under an organized or an unorganized modification.

At the head of the second division of the last class of philosophers to whom I have referred, we may perhaps place M. Buffon; who, incapable of acceding altogether to the mechanical hypothesis of Des Cartes, yet not choosing to allot to animals below the rank of man the possession of an intelligent principle, kindly endowed them with the property of life, which Des Cartes had morosely withheld by contending that they were mechanical machines alone, and very obligingly allowed them to possess a faculty of distinguishing between pleasure and pain, together with a general desire for the former and a general aversion for the latter. And having thus equipped

the different tribes of brutes, he conceived that he had sufficiently accounted for the existence of instinctive actions, by leaving them to the operation of this distinguishing faculty upon the mechanical properties of their respective organs. M. Reimar, however, an ingenious German professor, who flourished towards the close of the last century, did not conceive in the same manner: and hence, in a work immediately directed to the instinct of animals, and published at Hamburg in 1769, he divides the actions which he apprehends ought to pass under this name into three classes, mechanical, representative, and spontaneous: by the first intending all the proper actions of animal organs over which the will has no control, as the pulsation of the heart, the secretion of the various fluids, and the dilatation of the pupil; by the second, those which depend upon an imperfect kind of memory, and which so far as it is memory, brutes enjoy in common with mankind; and by the third, those which originate from M. Buffon's admitted faculty of distinguishing pleasure from pain, and the desire consequent upon it of possessing the one and avoiding the other.

It is, however, a sufficient answer to both these opinions, which in truth are founded upon one common basis, that, like the theories of Darwin and Smellie, they equally confound, though in a different manner, powers that are essentially distinct. The founders of these opinions may, with Darwin and Smellie, derive the instinctive

faculty from a principle of mind, or with Des Cartes and Dr. Reid from a principle of body; but they have no right to derive it from both, or to contend that its different ramifications originate in some instances from the one source, and in others from the other: though, as I have already observed, if they do derive it from mind alone, they will be compelled to admit its existence in a thousand cases in which not a single attribute of mind can be traced; while, if they derive it from body alone, they offer a cause that is inadequate to the effect produced.

M. Cuvier has taken a ground still different from any of these philosophers. He has not, indeed, expressly written upon the subject, but in a very accurate description of a somewhat singular orang-outang*, he sufficiently unfolds his opinion, that instinct consists of ideas which do not originate from sensation, but flow immediately from the brain, and are truly innate. His words are as follows: "the understanding may have ideas without the aid of the senses; two thirds of the brute creation are moved by ideas which they do not owe to their sensations, but which flow immediately from their brain. Instinct constitutes this order of phænomena: it is composed of ideas truly innate, in which the senses have never had the smallest share." There is a perplexity in this passage, which I am surprised at in the writings of so exact a physiolo-

* Annales du Museum et d' Hist. Nat. tom. xvi. p. 46.

gist: it first confounds instincts with ideas, as other philosophers have confounded them with feelings; and next affirms that ideas may flow from the brain without the aid of the external senses. That "the *understanding* may have ideas without the aid of the senses," I admit; but then it cannot have them from the brain, this being the very foundation and fountain of the senses; that from which they rise, and that in which they terminate. The understanding may, undoubtedly, have ideas from the exercise of its own proper powers alone, but this can only be the case with pure intellectual beings, and to assimilate the faculty of instinct with a faculty of this exalted character, is to clothe brutes with endowments superior to those of mankind; it is to elevate the orang-outang above an Aristotle or a Bacon.

Hence M. Dupont de Nemours, in an article read before the National Institute in 1807, advises to drop the term instinct altogether, as the only means of avoiding the rocks on some of which every writer has shipwrecked himself. He asserts, that there is in fact no such thing in existence; and that every action which has hitherto been described under such name, is the mere result of intelligence, of thought, habit, example, or the association of ideas. But this is only to revive, in a new form, the theory of Darwin or of Smellie; while it is only necessary to advert to the explanatory examples offered by M. Dupont himself, to see that many of them

are utterly incapable, by any ingenuity whatever, of being resolved into a principle either of intelligence or of mechanism.*

Nothing, therefore, is clearer than that the principle of instinct has hitherto never been explicitly pointed out, nor even the term itself precisely defined: it has been derived from mechanical powers, from mental powers, from both together, and from an imaginary intermediate essence, supposed equally to pervade all embodied matter, and to give it form and structure. It has been made sometimes to include the sensations, sometimes the passions, sometimes the reason, and sometimes the ideas: it has sometimes been restricted to animals, and sometimes extended to vegetable life. †

* Magazine Encyclopedique, Feb. 1807, p. 437.

† Dr. Hancock has lately published a very elaborate volume upon this subject, in which he takes a just view of the instinctive powers of animals, and is half-disposed to allow the same faculty to plants. But in merely distinguishing this faculty from reason, in the same way in which he distinguishes what have hitherto been called innate principles, a moral sense or faculty, light of nature, divine reason, as contra-distinguished from human reason, spiritual power, internal teaching, and even impulse and inspiration of the holy spirit, all which he contemplates as *intelligences of a like kind*, or to adopt his own words, "which we can only regard as an EMANATION of divine wisdom," he has so completely generalized the subject, not to say apparently blended into a common principle powers which have usually been regarded as specifically discrepant from each other, — even allowing the existence of the whole of them, and that they all flow, as in such case they must necessarily

Under these circumstances I shall beg your candid attention to a new view of the subject, and a view that may tend to give us a more definite idea of the nature of the action, and consequently of the extent and real meaning of the term.

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do, from the same almighty source of being, — that the peculiar nature of the instinctive faculty is left in as much obscurity as ever.

Dr. Hancock has trodden over an extensive ground of both physical and metaphysical research, and the excellent spirit with which he writes, entitles him to the esteem of every good man. Yet I am at a loss to determine why the principle of reason, or the reasoning soul in man, should not have as fair a claim to originate from the divine energy that pervades every part of nature, from the minutest atom to the highest spiritual afflation, as the faculty of instinct. By throwing, however, the principle of human reason out of the general pale, and by associating instinct with the high alliances just adverted to, the "unconscious intelligence," as Dr. Hancock has denominated it, of the lowest part of the animal creation, even that of insects and worms, is raised to a loftier and diviner rank than the peculiar principle by which man has hitherto been supposed to exercise a dominion over the rest of creation. "In the lowest order of animals," says Dr. Hancock, "the divine energy seems to act with most unimpeded power. It is less and less concentrated in the successive links of the living chain upward to man. — The lowest animal has this divine power, not of free choice, nor consciously: the HOLIEST of men has it also, but consciously and willingly: and it then becomes his ruling principle; his divine counsellor; his never-failing help; a light to his feet, and a lantern to his path." — Essay on Instinct, and its Physical and Moral Relations, p. 170—513.

In an early lecture of the preceding series* I endeavoured to point out the common or essential, and many of the peculiar properties of inorganic matter: and in a subsequent study† I attempted to lay down the more prominent characters by which inorganic is distinguished from organic matter, as a stone, for example, from a plant or an animal. I observed that, on investigating the history of the stone, it would be found to have been produced fortuitously; to have grown by external accretion, and only to be destructible by chemical or mechanical means: while, on investigating the history of the plant or the animal, it would be found to have been produced by generation; to have grown by nutrition, or internal instead of external accretion; and to be destructible by death; to be actuated by an internal power, and possessed of parts mutually dependent, and contributing to each other's functions. I observed farther, that in what this internal power consists we know not; that in plants and animals it appears to be somewhat differently modified, but that wherever we meet with it we term it the PRINCIPLE OF LIFE, and characterize the individual substance it actuates by the name of an organized being, from its possession of organized parts, in contradistinction to all those substances which are destitute as well of life as of internal organs, and which are hence denominated unorganized.

* Ser. I. Lect. IV. † Ser. I. Lect. VIII.

Upon another occasion I took a brief survey of the chief theories which have been offered upon the nature of this mysterious and fugitive essence*: which I observed was altogether a distinct principle from that of thought, and from that of sensation, for both these must also be kept distinguished from each other. I remarked, that in modern times it had at one period been said to be derived from caloric, thermogene, or the elementary matter of heat, as it exists in the organized system, from the well ascertained importance of this substance (if it be a substance) towards the perfection, and even continuance of all the vital functions: that at another time it was, for the same reason, supposed to consist of oxygene introduced into the system by every act of inspiration; and still more lately of the Voltaic aura, in consequence of those wonderful effects which this aura is now well known to produce on the muscular fibres of animals, not only during life, but often for some hours after death has taken place. I remarked farther, that Mr. John Hunter had traced this living principle to many of the organized fluids, as well as to the solids; and that he had especially developed it in the blood, which, coincidently with the Mosaic declaration, he believed to be its immediate seat. "The difficulty," observes he, "of conceiving that the blood is endowed with life while circulating, arises merely from its being a fluid;

* Ser. I. Lect. X.

and the mind not being accustomed to the idea of a living fluid." * And I observed, that by a variety of important and well-defined experiments, this enterprising and indefatigable indagator had succeeded in proving, not only that it contributes in a greater degree to the vital action and to the vital material of the general system than any other constituent part of it, whether solid or fluid, but has all the essential properties of life; that it is capable of being acted upon, and contracting, like the muscular fibre, upon the application of an appropriate stimulus, as atmospheric air, for example; on which occasion it becomes constringed into that cake or coagulum which every one must have beheld in blood drawn from the arm: that in all degrees of atmospherical temperature, of heat or cold, which the body is capable of enduring, it maintains an equality in its own temperature with scarcely any variation: that in the case of paralytic limbs it is the only power that continues vitality in them and preserves them from corruption: that though not vascular itself, it is capable by its own energy of producing new vessels out of its own substance, and vessels too, of every description, lymphatics, arteries, and even nerves; and finally, that though like the muscular fibre, it is capable of contracting upon the application of a certain degree of appropriate stimulus, like the

* Essay on the Blood, &c. p. 20.

muscular fibre, also, it is instantly exhausted of its vital power whenever such stimulus is excessive; and that the stroke of lightning which destroys the muscular fibre and leaves it flaccid and incontractile, destroys likewise the blood, and leaves it loose and incoagulable.

In every organized system, then, whether animal or vegetable, and in every part of such system, whether solid or fluid, we trace an evident proof of that controlling and identifying power which physiologists have denominated, and with much propriety, the PRINCIPLE OF LIFE. Of its cause and nature we know no more than we do of the cause and nature of gravitation or magnetism. It is neither essential mind nor essential matter; it is neither passion nor sensation; but though unquestionably distinct from all these, is capable of combining with any of them: it is possessed of its own book of laws, to which, under the same circumstances, it adheres without the smallest deviation; and its sole and uniform aim, whether acting generally or locally, is that of health, preservation, or reproduction. The agency by which it operates is that which we denominate or should denominate INSTINCT, and the actions by which its sole and uniform aim is accomplished are what we mean or should mean by INSTINCTIVE ACTIONS; or to speak somewhat more precisely, instinct is the operation of the living principle, whenever manifestly directing its operations to the health, preservation, or

reproduction of a living frame, or any part of such frame.*

The law of instinct, then, is the law of the living principle: instinctive actions are the actions of the living principle; and either is that power which characteristically distinguishes organized from unorganized matter, and pervades and regulates the former as gravitation pervades and regulates the latter, uniformly operating by definite means, in definite circumstances, to the general welfare of the individual system or of its separate organs; advancing them to perfection, preserving them in it, or laying a foundation for their reproduction, as the nature of the case may require. It applies equally to plants and to animals, and to every part of the plant as well as to every part of the animal, so long as such part continues alive. † It is this which

* This lecture was delivered January 1813; and Mr. Keith on Tuesday, December 7, 1813, had a valuable paper read before the Linnéan Society, in which, like the present system, he opposes Mr. Knight's hypothesis of gravitation as the cause of the peculiar stimulus and action of plants, and conceives that "the direction of the plumule and radicle of plants must be resolved into *vegetable instinct*, precisely analogous, and equally inexplicable with animal instinct."—See Thompson's Ann. of Philos. vol. iii. p. 71. or No. 13.

† Mr. Knight, while he seems desirous of resolving the principle of vegetable action into centripetal force, has shown that the sap of plants, as it exists in the leaves of potatoes and mint, and the leaves and shoots of the vine, possess what he calls organizable matter; and when plunged in a moist

maintains from age to age, with so much nicety and precision, the distinctive characters of different kinds and species; which, as is noticed in a preceding study, carries off the waste or worn out matter, supplies it with new*, and in a thousand instances suggests the mode of cure, or even effects the cure itself, in cases of injury or disease. It is "the divinity that stirs within us" of Stahl; the vis medicatrix naturæ of Hoffman and Cullen †, and the physicians of our own day. It is hence the strawberry travels from spot to spot, and the cod or the cuckoo, with a wider range, from shore to shore, or from climate to climate.‡

In supplying the place of reason, it is perpetually assuming its semblance. Let us take

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and warm soil will produce bulbs or roots more or less perfect, or at least preserve and endeavour to extend life. — Phil. Trans. 1816, p. 289. The whole, like the reproduction of polypes and worms from sections, ought rather to be resolved into the common law of instinct, the aim of which is health, preservation, or reproduction: and hence the sap of plants seems as much alive as the blood of animals.

* Ser. I. Lect. XIV.

† First Lines, vol. i. p. 91. 105.

‡ In conformity with the general principles of his system, Dr. Darwin ascribes this extraordinary faculty also to the power of reason. "It is probable," says he, "that emigrations were at first undertaken as accident directed, by the more adventurous of their species, and learned from one another like *the discoveries of mankind in navigation*." — Zoon. sect. xvi. 12.

an example or two from both the vegetable and the animal world.

In order that the seeds of plants should produce and perfect their respective kinds, it is necessary that their shoots should rise to the surface of the earth to enjoy the benefit of light and air. Now in whatever direction the eye of a seed, from which germination first radiates, is placed, these shoots ascend equally to the surface, either in curved or straight lines, according as such ascent may be most easily accomplished. Mr. John Hunter sowed a quantity of peas and beans with their eyes placed in different directions, in a tub, which he afterwards inverted, so that the bottom was turned uppermost, while the mould was prevented from falling out by a fine net. And in order that the under surface might possess a superior stimulus of light and heat to the upper, he placed looking glasses around the mouth of the tub in such a way that a much stronger light was reflected upon the inverted mould than that of the direct rays of the sun; while at the same time, he covered the bottom of the tub with straw and mats to prevent the mould, in this direction, from being affected by solar influence. Yet the same instinctive law of ascent still prevailed. After waiting a considerable length of time, and perceiving that no shoots had protruded through the lower surface of the mould, he examined the contents of the tub, and found that they had all equally pressed upwards and were making their way through the long column of

mould above them, towards the reversed bottom of the vessel; and that where the eyes had been placed downwards, the young shoots had turned round so as to take the same direction. As one experiment leads on to another, he determined to try the effect of placing other seeds of the same kinds in a tub, to which a rotatory motion should be given, so that every part of it might be equally and alternately uppermost, and the seeds should have no advantage in one direction over another. Here, as we often behold in other cases, the instinctive principle of accommodation was baffled by a superior power, and the different shoots, instead of ever turning round, uniformly adhered to a straight line, except where they met with a pebble or any other resistance, when they made a curve to avoid such obstruction, and then resumed a straight line in the direction into which they were thereby thrown, without ever endeavouring to return to the original path.

Among animals we have various proofs of a like impulse, and we have also proofs of its being occasionally overpowered by a stronger cause. Thus, in cases of eruptive fever, there is an obvious effort of the instinctive principle to throw the morbific matter towards the surface of the body, where it can do least mischief. And where a deep-seated abcess has formed in the immediate neighbourhood of a cavity that cannot be opened into without great danger, as that of the chest or the stomach, the

same instinctive principle of preservation leads forward the action in a different direction, though, as in the experiment of the bean-seeds in the inverted tub, with much greater labour and difficulty; and the abcess at length opens externally; and the remedial process of the formation of new living matter which immediately succeeds, commences under the same mysterious guidance. If, in the course of this common tendency to the surface, an obstructive cause be encountered, of superior force to the instinctive principle itself, the latter, as in the experiment of the beans exposed to the action of a rotatory motion, is overpowered, and the result is doubtful, and often fatal.

But these examples are general: let us advert to a few of a more particular nature. All the different species of birds, in constructing their nests, not only adhere to a peculiar plan, but, wherever they can obtain them, to peculiar kinds of materials: but if these materials be not to be procured, the accommodating power of the instinctive principle, as in the cases just related, directs them to others and suggests the best substitutes. Thus the red-breast uniformly prefers oak-leaves as a lining for her nest, whereever she can acquire them; but if these be not to be had, she supplies the want by moss and hair. So where the bird is of small size, and the eggs are naturally numerous, the nest is always made proportionally warm, that the nestlings may all equally partake of the vivifying heat. Thus

the wren, who lays from ten to eighteen eggs, constructs her little edifice with the greatest care and of the warmest materials; while the plover and the eagle, whose eggs are so few that the body may easily cover them, build with little solicitude, and sometimes content themselves with the naked cleft of a rock. And thus too, in very cold winters in Lapland, the fond water-fowl will occasionally strip the down off its breast to line its nest and protect its progeny.

When a wasp, in attempting to transport a dead companion from the nest, finds the load too heavy, he cuts off its head, and carries it out in two portions. *

A strawberry offset planted in a patch of sand will send forth almost the whole of its runners in the direction in which the proper soil lies nearest, and few, and sometimes none, in the line in which it lies most remote.

"When a tree which requires much moisture (says Mr. Knight,) has sprung up or been planted in a dry soil, in the vicinity of water, it has been observed that much the larger portion of its roots has been directed towards the water; and that when a tree of a different species, and which requires a dry soil, has been placed in a similar

* Smellie, vol. ii. 151. Reaumur, tom. xi. 241. For an account of other curious instances of instincts in insects, see Swedish Amœnitates Academicæ, vol. iii. art. 45. Noxa Insectorum, by M. A. Bœchner 1752; and compare with these the younger Hüber's Recherches sur les Mœurs des Fourmis Indigenes.

situation, it has appeared in the direction given to its roots, to have avoided the water and moist soil." *

"When a tree (remarks Dr. Smith) happens to grow from seed on a wall, (and he particularly alludes to an ash in which the fact actually occurred,) it has been observed, on arriving at a certain size, to stop for a while and send down a root to the ground. As soon as this root was established in the soil, the tree continued increasing to a large magnitude." †

The best means, perhaps, that a plant can possess of resisting the effects of drought, is a tuberous or bulbous root. The grass called phleum *pratense*, or common catstail, when growing in pastures that are uniformly moist, has a fibrous root, for it is locally supplied with a sufficiency of water; but in dry situations, or such as are only occasionally wet, its root acquires a bulbous form, and thus instinctively accommodates the plant with a natural reservoir. And there are various other grasses, as the alopecurus *geniculatus*, or geniculate foxtail, that exhibit the same curious adaptation. ‡

There are some philosophers and physiologists who have endeavoured to ascribe the whole of these very extraordinary phænomena to the mechanical powers of gravitation and centri-

* Phil. Trans. 1811. p. 210.

† Introd. to Botany, p. 114.

‡ See Smith, Introd. to Bot. p. 113. and p. 41.

fugal force: among whom I may especially mention Mr. Knight, who has attempted it in the very ingenious paper to which I have just alluded. There are others who ascribe them to the operation of an intelligent principle, among whom, more especially, as I have already observed, is Dr. Darwin. Of these two causes the instances just submitted to you, and thousands more might be added to them, sufficiently prove that the first is inadequate, and that the second does not always exist; at least that the phænomena are often found in organized forms in which, to a certainty, the precise organs do not exist, which are the only known seats of intelligence and sensation in the visible world. They are hence to be resolved into another cause, equally remote from either, more complex in its operations than that of gravity, but less so perhaps than those of intelligence and feeling; embracing a distinct family of well-defined and cognate actions, always aiming at the same common end, the perfection, preservation, or reproduction of the system in which they exist; and constituting what we should denominate instinct, the general property of the living principle, or the law of organized life in a state of action.

But the subject is too important to be closed here. It remains yet to point out the difference between instinct and sensation or feeling, as well as between instinct and reason. It remains yet for me so show you that all these are equally distinct principles; that they may exist separately or

conjointly; and it remains also for me to offer examples from among the more curious or striking instances of each of these recondite powers, both under a more simple and a more complicated modification. This shall form the basis of our ensuing study. At present I shall only further observe, that instinct may be defined the operation of the principle of organized life by the exercise of certain natural powers directed to the present or future good of the individual; and reason the operation of the principle of intellectual life, by the exercise of certain acquired powers directed to the same end. Both equally answer their object, are equally perfect in their kind, and equally display their common origin.

Whether with Reason or with Instinct blest,
Thus all enjoy the power which suits them best;
To bliss alike by that direction tend,
And find the means proportion'd to their end.
Say, where full Instinct is th' unerring guide,
What Pope or Council can they need beside?
Reason, however able, cool at best,
Cares not for service, or but serves when prest;
Stays till we call, and then not often near;
But honest Instinct comes a volunteer:
Sure never to o'ershoot, but just to hit,
While still too wide or short is human wit;
Sure, by quick nature, happiness to gain,
Which heavier reason labours at in vain.
Thts too serves always, Reason never long,
One must go right, the other may go wrong;
See then the acting and comparing powers,
One in their nature, which are two in ours;
And Reason raise o'er Instinct as you can,
In this 'tis God directs, in that 'tis man. POPE.

LECTURE V.

ON THE DISTINCTIVE CHARACTERS OF INSTINCT, SENSATION, AND INTELLIGENCE.

We closed our last study by observing that instinct is the operation of the principle of organized life by the exercise of certain natural powers directed to the present or future good of the individual, while reason is the operation of the principle of intellectual life by the exercise of certain acquired powers directed to the same end. Hence reason demands discipline and attains maturity; instinct, on the contrary, neither demands the one nor is capable of attaining the other; it is disciplined and mature from the first, and is as perfect in the infant as in the man.

Instinct, however, has as often been confounded with FEELING or SENSATION as it has with PERCEPTION, which is the outline or foundation of reason: and hence another source of those perplexities and errors in distinguishing between animal and vegetable life which we noticed in the preceding lecture: perplexities and errors which have been productive of the most absurd and disgusting consequences, and

especially in regard to the delicate and elegant science of botany.

Instinct, sensation, and perception, are all principles essentially different; they may, indeed, exist conjointly, but each of them is capable of existing separately. Instinct is the common law or property of organized matter, as gravitation is of unorganized; and the former bears the same analogy to sensation and perception as the latter does to crystallization and chemical affinity. Instinct is the general faculty of the organized mass as gravitation is of the unorganized mass; sensation and perception are peculiar powers or faculties appertaining to the first, as crystallization and affinity are appertaining to the second; they can only exist under certain circumstances of the organized or unorganized matter to which they respectively belong.

This parallel, indeed, may be carried much farther. Gravitation discovers itself under different modifications, different degrees of power, and consequently different effects. Instinct evinces an equal diversity in all these instances. Gravitation belongs equally to the smallest and to the largest portions of unorganized matter: instinct in like manner belongs equally to the smallest and to the largest portions of organized matter; it exists alike in solids and in fluids; in the whole frame, and in every part of the frame; in every organ, and in every part of every organ, so long as the principle of life continues. Sir

Isaac Newton established the doctrine of gravitation, and overcame all objections to it chiefly by the modesty with which he propounded and illustrated it. Without inquiring into the nature of its essence, he contented himself with recognizing it by its operations and laws. It is the aim of the present study to follow this great example; and leaving all discussions concerning the essence of instinct or of organized life, on which instinct is dependent, and which constitutes its sphere, as matter constitutes the sphere of gravitation, to point out nothing more than the nature of its action, and occasionally to catch a glance at the laws by which it is regulated.

From what has been already said, we see clearly that the power of instinct runs equally through the limits of vegetable and animal life, and consequently that instinct, sensation, and perception, whatever they consist in, are powers or principles essentially different. Instinct is the common property of organized life in all its forms, but life itself is not necessarily connected either with reason or sensation; and it is of no small consequence that we attend to this curious and extraordinary fact, the proofs of which are abundantly in our own possession. The blood is alive, and has all the common properties of life, as was very satisfactorily shown in an antecedent lecture, from the experiments of Mr. John Hunter; but we all know that it possesses neither feeling nor intelligence: the bones, the cartilages, the cellular membrane, and the cuticle,

are alive; but, in a state of health, they are equally destitute of both these properties, and whether in health or disease, are always destitute of the latter.

Sensation and perception, so far as we are capable of witnessing, can only exist in appropriate organs, as nerves, or modifications of nerves, which are the only known seat of the one, and the brain, or some modification of brain, which is the only known seat of the other. In the higher classes of animals, as mammals, birds, amphibials, and fishes, the nerves take their rise from the brain, or rather from some particular part of it. But this is not an indispensable law of life; for, in insects we meet with nerves, but no brain; and in most zoophytic and many other tribes of worms, with neither brain nor nerves. And hence, wherever these organs or either of them are discoverable, it is consistent with right reason to infer, that the faculty also exists to which they respectively give rise. But on the contrary, where neither of these organs exists, as in plants, and a multitude of the lowest tribes of animals, which in the zoological system of Lamarck, are on this account denominated *apathic* or insentient*, we have the same reason for inferring that, though life is present, and, indeed, in many instances peculiarly tenacious and vigorous, there is neither intelligence nor sensation; and that the whole of the vital func-

* Philosophie Zoologique.

tions and operations are performed, like the semblances of intelligence in the preceding case, by the common law of instinct; which, operating in different ways, in different organs, and beings of different structures, appertains to living matter of every kind.

These observations will apply to the vegetable as well as to the animal kingdom; for plants have a close analogy to the senseless tribes, the tubipores, madrepores, sponges, and infusory worms, we are now contemplating in their structure and origin, as well as in the limited range of their powers; these animals being in many instances equally simple in their make, and equally destitute of loco-motion; and equally propagating their kinds by the generation of buds or bulbs, instead of by that of seeds or eggs. Like these low kinds of animals, plants, moreover, are altogether without organs either of sense or intelligence: and it is consequently correct to infer, that they are equally without the faculties which it is the sole property of such organs to develope. And hence, again, however curious and astonishing the powers they occasionally evince, they are powers that can only be resolved, as in the case of zoophytic worms, into the ever present and ever active law of instinct or organized life. We hear, indeed, at times, of the ascription of mental or corporeal passions to vegetables; of general feeling and ideas; of love and languishment, and desire and aversion. But all this is fancy, and proceeds from an erroneous and contracted

view of the general nature of the law of instinct, and its extraordinary power of supplying the place of sense and reason, where these, or the organs in which they reside, are not present. We hear, in like manner, occasionally, of the brain, stomach, lungs, and nerves of vegetables; but all this is still more imaginary than the preceding; it is a mere fancy built upon a mere fancy: nobody has ever been capable of pointing out the probable or even possible seat of such organs, and they have only been idly conjectured because the faculties to which they give rise have been conjectured antecedently.

Is there then no such thing as instinctive feeling? — a term in every one's mouth, and which every one till he tries, supposes he comprehends? What but an instinctive feeling is the love of life, the dread of death, the economy of pairing, and the desire of progeny?

Wherever feeling exists, these, in a certain sense, may unquestionably be called instinctive feelings; but it should be remembered that the expression is, in every instance, of a compound character, and involves two distinct ideas, which may exist either separately or conjointly: and we have the same reason for using the phrase *instinctive intelligence* as *instinctive feeling*: for we can only mean, or ought only to mean, *instinct* combined with *intelligence*, or *instinct* combined with *feeling*, according to the nature of the case before us.

Combinations of this kind, indeed, are not un-

frequent; and I shall presently proceed to produce examples of them: but it becomes necessary to observe in the present place, that all the operations we are now adverting to, and which are usually characterised as instinctive feelings, as self-preservation, attachment to life, resistance of destruction, reproduction of the whole or of separate parts of the system, and even the economy of pairing, though often united with feeling, and not unfrequently with intelligence as well, occur nevertheless in a multiplicity of instances in which we have either direct proofs, or the most cogent reasons for believing, that there is neither feeling nor intelligence whatever; and that every thing is the result of pure, unintelligent, insentient instinct.

I have just observed that the blood is alive: it has all the *common* properties of life; irritability, contractility, and a power of maintaining its natural scale of heat, whatever be the temperature of the atmosphere by which it is surrounded: and it is perpetually showing its attachment to life by the due and discretionary exercise of these properties with a view of preserving life. It equally resists every excess of cold or of heat that may be injurious to it, and hence sometimes raises the thermometer and sometimes depresses it: it contracts itself, like the muscular fibre, upon the application of an appropriate stimulus, and conveys the principle of life, and powerfully assists in applying that principle to parts in which the vital action is languid, or has altogether ceased. There is no part of the animal system

that evinces in a more eminent degree the faculty of self-preservation, or self-production, of attachment to life, or of resistance to whatever is injurious, than the blood; and yet every one knows that this faculty is pure, unmixt instinct, equally destitute of feeling or intelligence: it is, as I have already defined instinct to be in every instance, a "simple operation of the principle of organized life by the exercise of certain natural powers directed to the present or future good of the individual." *

In the new-laid egg we have an equal proof of the same faculty of self-preservation, the same attachment to life, and resistance to destruction. For, like the blood of a healthy adult, the new-laid egg, the few and simple vessels of which are merely in a nascent and liquescent state, and which can scarcely be regarded otherwise than as a fluid, is capable equally of counteracting heat, cold, and putrefaction, and does forcibly counteract them for a considerable period longer than an egg that has been frozen or in any other way deprived of its vital and instinctive principle. It is this vital and instinctive principle that alone matures the egg, and shapes the matter of which it consists into distinct and specific lineaments, and calls forth the power which it does not yet possess, of sensation and perception. In what way these attributes are produced we

* Compare here Girtanner's Mémoires sur l'Irritabilité, considerée comme principe de vie dans la Nature organisée. — Journ. de Physique, 1790.

know not; but we see them issuing from the matter of the egg alone, when aided by the additional and cherishing power of simple heat. And provided it be properly regulated and applied, it is of no importance from what quarter such heat is derived; for we have already had occasion to observe, that the warmth of a sand-bath or of an oven will answer as effectually as that of the mother's sitting over it.

But let us not rest here: let us proceed to examples of the renewal or propagation of life, from parent stocks; to examples of the reproduction of the whole, or of separate parts of the system, in cases in which there is as obvious a destitution of sensation or intelligence; and where, as in the preceding instances, the whole must be the result of pure insentient instinct.

There is not a single organ in the animal frame but what is perpetually reproducing itself, alternately dying and renewing; so that the same man of to-day has not an individual particle belonging to him of that which constituted his corporeal frame ten, fifteen, or twenty years ago. And yet the whole of this important change, this entire reproduction of the material system, though occurring in sentient and even in intelligent organs, occurs at the same time without any kind of feeling or consciousness in the individual, or the organs that constitute the individual.

This very curious fact is still more obvious in the generation of new matter of every kind,—

muscular, glandular, bony, and even nervous, upon the death of a considerable portion of an organ in consequence of external injury or other violence. The nice and admirable law by which the dead substance is carried off, and its place supplied by the gradual reproduction of fresh matter of the very same nature and properties, I have already explained.* In the separation of the dead from the living parts, there is generally, though not always, some degree of pain, from the increased local action that takes place, and more especially from the tension given to the skin by the secretion of sound and healthy pus, in order to effect its bursting; but in the actual generation of the new material that is to fill up the cavity, and supply the place of what is lost, there is no pain or sensation whatever in a healthy process; while, as I have likewise already observed, the pointing of the abscess, like the pointing of the seeds of peas or beans, in what direction soever they are sown, will be uniformly towards the surface †, whatever be the obstacles that must be overcome in order to reach it.

The generation of life, then, no more necessarily demands or implies the existence of sensation, than attachment to life, or a self-preserving principle: it may be combined with it, but it may also exist separately or without it. Monro, indeed, has distinctly proved by experiment, that the limb of a frog can live and be

* Ser. I. Lect. XIV. † Ser. II. Lect. IV.

nourished, and its wounds healed, without any nerve whatever, and consequently without any source or known possibility of sensation.

Let us apply this reasoning, which I admit is thus far drawn from individual parts of the system alone, to a regeneration or reproduction of the entire system.

The lungs or gills of an animal are precisely analogous to the leaves of a plant. All these, as I have already observed, are perpetually changing by a nicely balanced alternation of decay and reproduction. In animals and ever-green plants this change is so gradual as to elude all notice. In deciduous plants, on the contrary, it is sudden and obvious to every one; yet the same instinctive power that produces the one change, produces also the other; and as in the former case, we have a perfect consciousness that the effect takes place without any sensation or intelligence, no man will be so extravagant as to maintain that there is any sensation or intelligence concerned in the latter. But the very same process that produces the leaves or shoots of plants, produces also their buds; the vegetable vessels are the same; there is no new principle employed, but merely an adaptation of the one common principle of instinct or the law of simple life, to the production of a different effect; for the very same eye may, by too much or too little pruning of the wood, be converted into a shoot or into a bud. The buds of plants, however, are their proper offspring; and,

in many cases, as perfectly so, as their seedlings, or those reared from seeds. In other instances we find a progeny equally perfect produced by a separation of bulbs or roots, or by radicles shooting out from creeping joints, as in the strawberry. In all which it would be absurd, even if plants were possessed of a nervous system, which they are not, to contend that a sense of feeling was more exerted than in the reproduction of the separate organs of an animal, to support the common wear and tear of animal life.

Why then should it ever have been contended that such a kind of sensation is necessary in the formation of seeds, by the conjoint action of what have been denominated a male and female organization? The stimulus of moisture, of light, heat, and air, evolves equally the specific flower; and the ever-present and all-pervading law of Nature determines the different parts of the flower, or the different flowers themselves, to be of different characters: the farina is secreted from the anther, a part which is called the male organ; and as it drops upon the open tube of the pistil, which is denominated the female organ, it becomes a new stimulus, and excites to a new action. But neither stimulus nor action are necessarily sensation, nor the sources of sensation. The pistil, or rather the receptacle which lies at the bottom of the pistil, in consequence of this new excitation, evolves or produces a new material, which we call a seed; but during the formation and evolution of this seed, from first to last, there is no more neces-

sity for supposing the existence of any thing like sensation, than during the antecedent stimulus of the light and heat, and moisture, upon the parent stem by which the flower itself became evolved; or during the same stimulus upon the joints or bulbs of the plant by which an equally healthy and perfect progeny has, perhaps, been produced from these different organs.

I have already observed, that in the lowest class of animals we meet with instances of reproduction equally varied, and of the very same nature: sometimes by buds or bulbs, as in the case of the polype; sometimes by slips or lateral offsets, as in one or two species of the leech; and sometimes, and perhaps more generally, by seeds or ova. But as, in the tribes I now refer to, we meet with neither nerves or nervous system, and as the reproduction of living matter does not necessarily demand the existence of a nervous system, or of that corporeal feeling to which alone, so far as we are acquainted with nature, a nervous system is capable of giving birth; we have the strongest reason for supposing that the generation of progeny is, in these cases, as unaccompanied with passion or sensation as in the instance of plants.

I have dwelt the longer upon this subject, as being anxious to divest one of the most elegant and interesting branches of natural history of the grossness and indelicacy with which it has been encrusted by the language and opinions of many modern physiologists; and to open it as

widely as possible to the study and pursuit of every one.

It must be obvious, I think, that instinct has no more necessary connection with feeling or sensation than with intelligence; and that even the faculties of attachment to life, resistance to destruction, the economy of pairing, and the process of generation, though often combined with both sensation and intelligence, are not necessarily combined with either of them; that intelligence is not more discrepant from sensation than sensation is from instinct; that either may exist separately, and that all may exist together.

Whence derive the young of every kind a knowledge of the peculiar powers that are to appertain to them hereafter, even before the full formation of the organs in which those powers are to reside? To adopt the beautiful language of the first physiologist of Rome.

Cornua nata prius vitulo quam frontibus exstent,
Illis iratus petit, atque infestus inurguet:
At catulei pantherarum, scymneique leonum,
Unguibus, ac pedibus jam tum morsuque repugnant,
Vix etiam quom sunt dentes unguesque createi.
Alitum proporso genus alis omne videmus
Fidere, et a pennis tremulum petere auxiliarum. *

The young calf whose horns
Ne'er yet have sprouted, with his naked front
Butts when enrag'd: the lion-whelp or pard
With claws and teeth contends, ere teeth or claws
Scarce spring conspicuous; while the pinion'd tribes
Trust to their wings, and, from th' expanded down
Draw, when first fledg'd, a tremulous defence.

* De Rer. Nat. v. 1038.

In like manner an infant, in danger of falling from its nurse's arms, stretches out its little hands to break the fall, as though acquainted by experience with the use of such an action. We here meet with an instance of pure instinct; but we pursue the same conduct in adult age, and we have then an example of instinct combined with intelligence; and intelligence, instead of opposing the instinctive exertion, encourages and fortifies it. So when caterpillars, observes Mr. Smellie, are shaken from a tree, in whatever direction they descend, they all instantly turn towards the trunk and climb upwards, though till now they have never been on the surface of the ground.

The vegetable kingdom offers us examples of simple instinct equally singular and marvellous. Thus the stalk of the convolvulus twines from the left or east by the south to the west, the face being towards the south: the phaseolus *vulgaris*, or kidney-bean, pursues the same course: while the honey-suckle and the hop take a perfectly reverse direction. Who will reveal to us the cause of these differences?

In the following instances the cause is obvious: it proceeds from the peculiar structure and power of the different animals to which they relate: and it would perhaps be as obvious to us in the preceding, were we as intimately acquainted with the nature of plants as of animals. The squirrel, the field-mouse, and the very curious bird called nut-hatch (sitta *Europæa*,) live equally on hazle-

nuts; but each of them opens them in a very different manner. The squirrel, after rasping off the small end, splits the shell in two with his long fore-teeth, as a man does with his knife: the field-mouse nibbles a hole with his teeth as regular as if drilled with a wimble, and yet so small that it is wonderful how the kernel can be extracted through it: while the nut-hatch picks an irregular ragged hole with his bill; but as this artist has no paws to hold the nut firm while he pierces it, like an adroit workman he fixes it, as it were, in a vice in some cleft of a tree or in some crevice; when, standing over it, he readily perforates the stubborn shell; and while at work makes a rapping noise that may be heard at a considerable distance. *

The sphex or ichneumon wasp, in its perfect state, feeds on the nectary of flowers; but as soon as she is fitted to deposite her eggs, she becomes actuated by an appetite of another kind. She first bores a small cylindrical hole in a sandy soil, into which, by accurately turning round, she drops an egg: she then seeks out a small green caterpillar that inhabits the leaves of the cabbage-plant, and which she punctures with her sting, yet so slightly and delicately as not to kill it; she then rolls it up into a circle, and places it in the sandy nest immediately over the egg. She continues the pursuit till she has counted twelve; and, has in like manner, de-

* See White's Nat. Hist. of Selborne.

posited twelve caterpillars one over the other; and repeats the same process till she has exhausted herself of her entire stock of eggs. She immediately closes the holes and dies, entrusting her eggs to the parent heat of the sun. The egg in each separate cell or aperture is soon hatched, and finds its food duly prepared for it, and from its enfeebled state incapable of resisting its attack, though preserved from putrefaction by the little life that has remained to it. It feeds progressively on the twelve caterpillars; and by the time it has exhausted them, becomes fitted for and converted into a chrysalis; in due time it awakes from its dormancy, works its way to the surface of the earth, throws off its chrysalid investment, finds itself accommodated with wings, rises into the atmosphere, feeds on the honey of plants instead of on maggots; and at length pursues the very same train of actions to provide itself with a progeny which was pursued by the parent insect of the year before.

In what I have thus far advanced, I have chiefly proved, however, that instinct may exist separately: I will next proceed to a few examples, in which it will be clear to every one that it may exist in conjunction with each of the other two principles of sensation and intelligence.

And, first, as to its union with sensation. Wherever a nervous system is to be traced, which alone is the source of sensation, we have abundant proofs of such an alliance. We meet

with it, without having language by which to describe it, in the glow and elasticity of health, in the satisfaction of a cheerful meal, and in the refreshment of sound and natural sleep after fatigue; and we meet with it still more obviously, and in diversities which language is capable of characterizing, in all those natural emotions to which we have just adverted, and which, in consequence of such alliance, have obtained the popular name of instinctive sensations or feelings, but which in reality are peculiar instincts combined with peculiar feelings.

Let us select a few other examples. We are told by Galen *, that on opening a goat big with young he found one of the young ones alive, which he hastily snatched up, and took into a room where there were various vessels severally fitted for the purpose with wine, oil, honey, milk, grains and fruits. The little kid first rose upon its feet and walked; then shook itself, and scratched its side with one of its hoofs; it next smelt alternately at all the dishes before it, and at last fixed upon and licked up the milk. In this case the sense of smell went distinctly in aid of the instinctive search after food, and determined the particular kind: so that the instinct and the sensation co-operated. Thus rabbits, when left to the operation of pure instinct, dig holes in the ground for warmth and protection: but after continuing for some time in a domestic state, and finding that they can

* De Locis, lib. vi. cap. 6.

obtain a more comfortable asylum by other means, and with less labour, they seldom pursue, even when they have an opportunity, the instinctive process, but burrow in the straw, or whatever material is provided for them.

In this case the sense of superior comfort combines itself, as in the preceding, with the instinct, and pursues the same end, though by a change of the means. So again, the new-born young of all animals, in whatever way they take their food, are at first stimulated by instinct alone. The lamb sucks, the chicken pecks, and the nestling of the sparrow gapes. In like manner, the mother secretes or selects its food from an instinctive stimulus alone. The udder of the dam swells and becomes painful, the crop of the pigeon does the same; and there are some birds, whose common food is grain, that during this season devour for their young, spiders and other insects, which nothing could induce them to touch at any other time. This sweet intercourse of natural action lays a foundation for something that in a short time shows itself to be superior to instinct, though it has often, but erroneously, been so denominated. The young of two different mothers, if interchanged as soon as they are born or hatched, are as satisfied with the foster or suppositious as with the natural parent: and the mothers, unless made suspicious of the deception, are as satisfied with their foster or suppositious young. But let the same interchange be attempted a week or a month

afterwards, and in no case will it succeed. Short as has been the intervening period, there has been a birth of feeling as well as a growth of form; the rising sense has united itself with the already mature instinct; and the natural nurse and the natural nursling will pine equally, if separated from each other.

The poet we have just adverted to, who may pre-eminently be called the poet of nature, has beautifully illustrated this remark by the yearning affection of the cow for her young calf when it has strayed from her or she has been robbed of it; hunting after it with intense anxiety in every direction, mourning for it with a cry that cannot fail to wind itself into every feeling heart, and equally refusing the fattening glebe and the refreshing stream.* The female Dugong or sea-cow of the Sumatra coast, whose general history we have already given a glance at†, evinces a like degree of maternal affection; insomuch that when its young has been entrapped or speared, the mother pursues it so closely and so fearlessly as to be taken with the greatest ease. The young sea-calves have a short, sharp, pitiable cry, which they frequently repeat; and, like the stricken deer, are also said to shed tears, which, Sir Thomas Raffles tells us, are carefully preserved by the common people as a charm, the possession of which is supposed to secure the affections of those to whom they are

* De Rer. Nat. ii. 352. † Vol. II. Ser. II. Lect. II. p. 59.

attached in the same manner as they attract the mother to her young. *

The instinct of this early age, however, belongs to such early age alone, and to the purpose of such early age alone: and when it has answered that purpose it ceases, and we meet with no more trace of it: but the feeling which follows so close upon it, and to which perhaps it has given birth, is of a higher order, and continues for a much longer period of time; and for a period of time, indeed, directly proportioned to its intensity, or in other words, to the ascending rank of sentient or percipient life in which it makes its appearance.

Hence in the two lowest classes of animals, we meet with nothing of the sort whatever; the young of insects and worms having a foreign food provided for them without the intervention of the mother: and hence, too, in various quadrupeds and birds the feeling progressively dies away as the young become independent; while in man we behold the principle of intelligence, in its most lovely and interesting character, a moral and internal feeling, a sense of gratitude and veneration on the one side, of keen complacency and delight on the other, and of active affection on both, catching hold of the two preceding principles, and producing a strong cord of interunion that can never be broken but with the cords of the heart itself.

* Phil. Trans. 1820. p. 181.

Something of the kind is occasionally, indeed, o be met with in quadrupeds, as I have formerly observed in the case of the seal and lamantin tribes (trichecus *Manatus*), which pass through life in families of single male and single female, never deserting or deserted by their young, till the latter, having reached the term of maturity, separate to found families of their own.

In these cases we see examples of all the three principles of instinct, sensation, and intelligence in a state of union : and we occasionally meet with still more extraordinary examples of the same fact. One of the most extraordinary, perhaps, is that related by Mr. Gilbert White, in his very interesting History of Selbourn, of the gratitude and affection of a young hare towards a cat by which it had been suckled and brought up ; the leveret following the cat about the garden, playing with her like a kitten, and bounding towards her upon her purring or uttering any other call of tenderness.

We see something of the same kind of internal feeling, and often exalted to a still higher pitch, in the gratitude and affection of the fond and faithful dog for a kind and indulgent master ; occasionally indeed rising superior to, and openly triumphing over the strongest instinctive feelings of the animal frame, over thirst and hunger, and the love of life itself; and inciting him to perish voluntarily by the side of his master and share his grave, rather than abandon his corse, when in the course of a solitary journey

he has suddenly fallen a victim to accident or violence. The late Bishop of Landaff has a striking anecdote to this effect in his very interesting Life, in which he relates the sudden disappearance of a man, who, it seems, had perished on the top of Helvellyn ; his body was found two months afterwards in this exposed and desolate spot, with his faithful dog still sitting by it.* And he adds a similar tale, told him by the Duke of Northumberland, concerning a young antelope that had perished by a fall, whose mother immediately quitted the pasture in which she was feeding, sat piteously by the side of the body, which she refused to quit, and died of grief and hunger.

I will only adjoin another case of a like interesting kind that occurred not long since in my own family. A favourite cat, that was accustomed from day to day to take her station quietly at my elbow, on the writing-table, sometimes for hour after hour, whilst I was engaged in study, became at length less constant in her attendance, as she had a kitten to take care of. One morning she placed herself in the same spot, but seemed unquiet; and, instead of seating herself as usual, con-

* Sir Walter Scott has, with much judgment, selected a similar, perhaps the same, story, as the basis of one of the most impressive and popular ballads in the English language : —

I climb'd the dark brow of the mighty Helvellyn,
Lakes and mountains beneath me gleam'd misty and wide,
All was still save, by fits, when the eagle was yelling,
And starting around me the echoes replied, &c. &c.

tinued to rub her furry sides against my hand and pen, as though resolved to draw my attention and make me leave off. As soon as she had accomplished this point she leaped down on the carpet, and made towards the door with a look of great uneasiness. I opened the door for her as she seemed to desire; but instead of going forward, she turned round and looked earnestly at me as though she wished me to follow her, or had something to communicate. I did not fully understand her meaning, and being much engaged at the time, shut the door upon her that she might go where she liked. In less than an hour afterwards she had again found an entrance into the room, and drawn close to me; but instead of mounting the table and rubbing herself against my hand as before, she was now under the table and continued to rub herself against my feet; on moving which, I struck them against a something which seemed to be in their way; and, on looking down, beheld, with equal grief and astonishment, the dead body of her little kitten covered over with cinder-dust, and which, I supposed, had been alive and in good health. I now entered into the entire train of this afflicted cat's feelings. She had suddenly lost the nursling she doted on, and was resolved to make me acquainted with it, — assuredly that I might know her grief, and probably also that I might inquire into the cause; and finding me too dull to understand her expressive motioning that I would follow her to the cinder heap on which the dead kitten had

been thrown, she took the great labour of bringing it to me herself, from the area on the basement floor, and up a whole flight of stairs, and laid it at my feet. I took up the kitten in my hand, the cat still following me, made inquiry into the cause of its death, which I found, upon summoning the servants, to have been an accident in which no one was much to blame; and the yearning mother having thus obtained her object, and gotten her master to enter into her cause, and divide her sorrows with her, gradually took comfort, and resumed her former station by my side.

Yet, not unfrequently we meet with instances of the union of intelligence alone with instinct alone; of design and contrivance directed to extraordinary occasions, no moral or internal feeling being necessary.

The rook usually and instinctively builds her nest in the tallest branches of the tallest trees: in Welbourn church-yard, however, as we learn in a letter to Dr. Darwin, from a relative, a rookery was not long since formed on the outside of the spire, and the tops of the loftiest windows. There had formerly been a row or grove of high trees in the neighbourhood, but they had been cut down; and their aerial tenants being dispossessed of their proper mansion, had betaken themselves to the church-spire and windows, as the most appropriate building for their purpose; and had thus manifestly evinced the alliance of instinct with intelligence.* So the jackdaws of Selbourn, ac-

* Darw. 8vo. i. p. 241.

cording to Mr. White, not finding a sufficiency of towers and steeples, and lofty houses, on which they usually hung their nests in this pleasant village, accommodated themselves to the occasion, and built them in forsaken rabbit-burrows.

The ostrich is accused of a total want of natural feeling, because she abandons her eggs to be hatched by the heat of the sun: when incubation is necessary, however, the ostrich instinctively employs it, and that too in conjunction with an intelligence which is rarely evinced by other birds. Thus in Senegal, where the heat is still great, she relinquishes her eggs during the day, but sits upon them through the night; and at the Cape of Good Hope, where the heat is less considerable, she sits upon them, like other birds, both day and night. In like manner ducks and geese, though not renowned for sagacity, cover up their eggs when they quit them, till their return to the nest; and there are few birds that do not turn and shift their eggs at different periods of the tedious process of incubation, so as to give an equal degree of warmth to every part. We have already observed, however, that the accommodating power of the instinctive principle to particular circumstances, which so wonderfully enables it to supply the place of reason, gives it, in many instances, a striking assumption of its character. It is, hence, possible that one or two of the examples here noticed may be referable to this accommodating faculty;

but the exercise of a certain extent of reason, as a distinct principle, must be admitted in several of them, in which there is not only a display of design and contrivance towards the accomplishment of this new object, but apparently of design and contrivance as the result of a general convention and discussion of the question submitted to the tribe assembled on the occasion, and whose common interest is at stake.

Generally speaking, the principle of instinct is perfect and infallible in its guidance; there is, however, an occasional aberration, perhaps a playfulness in this as in every other part of nature. Thus the light of the candle is, by flies and various other insects, mistaken for the light and warmth of the sun, often to the loss of limb or even life itself. So the flesh-fly and blow-fly (musca *carnifica* and m. *vomitoria*) are deceived by the smell of the carrion-flower (stapelia *hirsuta*), and often deposite their eggs upon it instead of upon putrescent meat; in consequence of which the grubs die almost as soon as hatched, for want of proper nourishment.

In like manner, we find occasionally a few migrating birds in countries where they were never seen before, and which have evidently mistaken their course.

There are various instincts, connected for the most part with a singularity of configuration, that are either peculiar to the birds, or altogether anomalous. But they show, at least, that the great Author of nature is the lord and not the slave of

his own laws, and is at all times capable of producing definite effects by a diversity of means. Thus the didus *solitarius*, or solitary dodo, in general esteemed almost as stupid a bird as the ostrich, divides the labour of incubation with his female, and alternately sits upon the eggs during her absence. The hen of this tribe has a protuberance on each side the breast, like the teat of quadrupeds. When the young of the turtle-dove are hatched, and capable of receiving nutriment from the crop of the mother, the male parent experiences an equal change and enlargement in this organ, secretes the same nutritive material, and equally contributes to the support of its nestlings.

I have already observed that insects in general deposite their eggs in places admirably suited to the future wants of the nascent larves, and then for ever take leave of their embryo progeny: but the forficula *auricularia*, or common ear-wig, broods over her young like a hen, and only quits them at night, which is the usual period in which this genus flies in pursuit of food or recreation.

Among migrating birds it is not very uncommon for the males alone to dare the dangers of a distant voyage, and to leave the females behind them; but in the fringilla *Cœlebs*, or chaffinch, we find this rule completely inverted; for the female chaffinches of Sweden quit their males and migrate to Holland towards the winter, and duly return to them in the spring; while many

of the males indulge in a profound sleep during the greater period of their absence.

Most vegetables indulge in a winter-sleep of the same kind; but there are some that sleep still longer. Thus the tuberose root of the ferraria *Ferrariola*, an ornamental herbaceous plant of the Cape of Good Hope, remains torpid every alternate year, and sometimes continues in this state for two years together, without putting forth either leaf or fibre.

Let us close these observations with a momentary glance at the very singular instinctive powers of the cancer *ruricola*, or land-crab. This is an inhabitant of the tropical regions, and especially of the Bahama islands: it is gregarious, and associates in large bodies that preserve an orderly society, for the most part, in the recesses of inland mountains, though they regularly once a year march down to the sea-side in an army of some millions, to deposite their spawn in the ocean. The time selected for this expedition is usually the month of May, when they sally forth from the stumps of hollow trees, the clefts of rocks, and subterranean burrows, in enormous multitudes. The whole ground, indeed, is covered with this reptile band of adventurers; and no geometrician could direct them to their destined station by a shorter course. They turn neither to the right hand nor to the left, whatever be the obstacles that intervene; and if they meet with a house they will rather attempt to scale the walls than relinquish the unbroken

tenour of their way. Occasionally, however, they are obliged to conform to the face of the country; and, if it be intersected by rivers, they pursue the stream to its fountain-head. In great dearth of rain they are compelled to halt, when they seek the most convenient encampment, and remain there till the weather changes. They make a similar halt when the sun shines with intense heat, and wait for the cool of the evening. The journey often takes them up three months before they arrive on the sea-coast; as soon as they accomplish which, they plunge into the water, shake off their spawn upon the sands, which they leave to nature to mature and vivify, and immediately measure back their steps to the mountains. The spawn, thus abandoned, are not left to perish: the soft sands afford them a proper nidus; the heat of the sun, and the water, give them a birth; when millions of little crabs are seen crawling to the shore, and exploring their way to the interior of the country, and thus quitting their elementary and native habitation, for a new and untried mode of existence. It is the marvellous power of instinct that alone directs them, as it directed the parent hosts from whom they have proceeded; that marvellous power which is co-extensive with the wide range of organic life, universally recognized, though void of sensation; consummately skilful, though destitute of intelligence; demanding no growth or developement of faculties, but mature and perfect from its first formation.

The general corollary resulting from these

observations is as follows: that instinct, as I have already defined it to be, is the operation of the principle of organized life by the exercise of certain natural powers directed to the present or future good of the individual; while reason is the operation of the principle of intellectual life by the exercise of certain acquired powers directed to the same object: that it appertains to the whole organized mass, as gravitation does to the whole unorganized; equally actuating the smallest and the largest portions, the minutest particles and the bulkiest systems; every organ and every part of every organ, whether solid or fluid, so long as it continues alive: that, like gravitation, it exhibits, under particular circumstances, different modifications, different powers, and different effects; but that, like gravitation, too, it is subject to its own division of laws, to which, under definite circumstances, it adheres without the smallest deviation; and that its sole and uniform aim, whether acting generally or locally, is that of perfection, preservation, or reproduction.

Of its mode of existence we know nothing: but as little do we know of the principle of gravitation or of mind. We can only assure ourselves that they are distinct powers, perhaps distinct essences; and we see them acting, as well separately as conjointly, for the general good. Under their accordant influence we behold the plastic and mysterious substance of matter, which we must be especially careful not to confound with themselves, rising from "airy nothing"

into entity; ascending from invisible elements into worlds and systems of worlds; from shapeless chaos and confusion, into form, and order, and harmony; from brute and lifeless immobility, into energy and activity; into a display of instinct, feeling, perception; of being, and beauty, and happiness. One common design, one uniform code of laws, equally simple and majestic, equally local and comprehensive, pervades, informs, unites, and consummates the whole. The effect then being one, the mighty cause that produced it must be one also; an eternal and infinite unity — the radiating fountain of all possible perfections — ever active, but ever at rest — ever present, though never seen — immaterial, incorporeal, ineffable: but the source of all matter, of all mind, of all existences, and all modes of existence. Whatever we behold is God — all nature is his awful temple — all sciences the porticoes that open to it: and the chief duty of philosophy is to conduct us to his altar; to render all our attainments, which are the bounteous afflations of his spirit, subservient to his glory; and to engrave on the tablet of our hearts this great accordant motto of all natural and all revealed religion, of Athens and of Antioch, of Aratus and of St. Paul, "in him we live, and move, and have our being."

Ἐκ Διὸς ἀρχώμεσθα —
πάντη δὲ Διὸς κεχρήμεθα πάντες·
Τοῦ γὰρ καὶ γένος ἐσμέν. *

* Arat. Phænom. 1, 4, 5.

LECTURE VI.

ON SYMPATHY AND FASCINATION.

We have now summarily contemplated several of the most important phænomena both of organic and inorganic nature: and have traced out something of the laws by which these phænomena are produced and regulated. Amongst the most extraordinary facts that have occurred to us, may perhaps be enumerated the occasional production of effects by causes which do not appear to be immediately connected with them; the operation of one body upon another remotely situated, and which, so far as we are able to trace them, have no medium of communication. The sun is perpetually acting upon and influencing the earth, the earth the moon, the moon the ocean: the magnet operates upon iron, whatever be the sheet of substance interposed; and if the iron be divided into small filings, so that the different particles may move with facility, communicates to each an obvious polarity, and gives to the whole a peculiar and beautiful arrangement. And the repulsive and attractive powers of the electric fluid are supposed to act upon each other, not only where two or more particles of this fluid are perfectly or very nearly in contact,

but betwixt all particles of it, at all distances, whatever obstacles may lie between them.*

Chemical science lays open to us a wonderful field of similar affections and affinities. Within the range of its peculiar regions, we behold almost every substance evincing a determinate series both of inclinations and of antipathies, strongly attracted by one kind of material, indifferent towards a second, and powerfully avoiding a third. From these extraordinary endowments proceeds unquestionably the union or separation of different bodies, according to the nature of the endowments that are called into action; but their influence, in perhaps every case, commences before such bodies are in a state of contact, and in many cases while they are at a considerable distance from each other.

From lifeless and inorganic matter these peculiar and mysterious affections ascend to vegetable life, and display to us germs, molecules, and fibrils, uniting not at random with germs, molecules, and fibrils, but each selecting the other, and occasionally attracting them from remote situations, the female male, and the male female rudiments; and this with the nicest discrimination of their various powers of crassitude or tenuity, and consequently of reciprocal adaptation, without which no vital entity would ensue. Perhaps one of the most extraordinary instances of this kind we are acquainted with

* Young's Lectures, vol. i. p. 659.

exists in the valisneria *spiralis*, an aquatic and diœcous plant, or one belonging to that class in which the male and the female are distinct individuals. The male has a long spiral stem, by which its flower is enabled at all times to adapt itself to the surface of the water, from the bottom of which the plant shoots forth, and to float in the middle of tide-streams of almost every variation of ascent. The stem of the female is straight, and much shorter; and is hence only found in shallow waters, or on shores, where the tide exerts but little influence. Thus differently formed and remotely situated, how is that union to take place, without which there could be no increment, and the valisneria would be blotted out of the book of vegetable life. The whole process is wonderful; a part of it is obvious, but the rest is concealed. As soon as the male flower is become perfected, the spiral stem dries away, and the flower separates itself from it, and sails gallantly over the water in pursuit of the female, for the most part driven, indeed, by a current of the wind or of the stream; yet as soon as it arrives within a certain range of the female, it obeys a new influence, and is attracted towards it in various instances even in opposition to wind and tide, the powers that have hitherto directed it. What, now, is this stupendous influence that thus operates at a distance, and gives to the male flower a new direction? It may possibly be a peculiar kind of odour or aroma; and perhaps this is the most

philosophical way of accounting for the fact: but however philosophical, it is altogether hypothetical, for we are incapable of ascertaining, and know nothing of the existence of any such exhalation; and could we detect it, we should be still totally ignorant of its mode of operation.

The same curious phænomena seem not unfrequently to take place in the animal system: for here also we can truly affirm that bodies appear to act where they are not, and where we can trace no communicating medium. A small laceration on one of the fingers, sometimes in our own country, but far more frequently in warmer climates, will produce, if unattended to, the disease of a locked jaw; and an inflammation or abscess of the liver, a severe pain in the left shoulder. Yet in both these cases we are not distinctly acquainted with any closer connexion subsisting between the finger and the jaw, or the liver and the left shoulder, than there is between these different organs and any other part of the system. We may theorize upon the nature of the communication, but we have no certain knowledge.

The same fact is strikingly exemplified in the different operations of different poisons when introduced into the stomach. Thus it has been observed by Mr. Brodie, in a valuable and ingenious paper, published in the Philosophical Transactions for 1811, that the infusion of tobacco, applied to any part of the alimentary canal, almost instantaneously, and apparently by some other means than that of the circulation of

the blood, destroys the action of the heart, and consequently stops the pulsation, while the brain, and the other muscles of the system, besides the heart, are comparatively but little affected: and that alcohol, on the contrary, the essential oil of almonds, and the juice of aconite, destroy as rapidly the action of the brain, and throw the animal into violent convulsions, laborious respiration, and deadly stupor, while the heart continues its usual or nearly its usual pulsation, not only during the whole of the symptoms, but for some minutes after death has actually taken place. The woorara, perhaps a species of ticunas, with which the Indians of Guiana poison the points of their arrows, produces the same effect, when inserted into a wound, as aconite-juice introduced into the stomach: it operates almost entirely upon the organ of the brain, and more rapidly than it could arrive there by the course of the circulation. The upas *Antiar*, the anthiar *Toxicaria* of Leschenaut, on the contrary, one of the most fatal vegetable poisons of the island of Java, produces death when inserted into a wound, not by affecting the brain, but, like the infusion of tobacco in the stomach, by destroying the action of the heart.

In like manner, the poison of the cerastes, or horned snake, though so fatal in a few hours, often in a few minutes when received by a wound, seems to produce little or no effect when tasted and swallowed. "It is clear," says Bruce, "the poison has no activity, till through some sore or

wound it is admitted into circulation.* And a German physician (continues he) was bold enough to distil the pus or putrid matter flowing from the ulcer of a person infected by the plague, and taste it afterwards without bad consequences."

Of the immediate cause or nature of this diversity of influence — this discrepancy of action between remote organs, we know no more than we do of the cause or nature of gravitation, of magnetism or electricity. It has been denominated, indeed, *sympathy*, *fellow-feeling*, or *consent of parts*, in the general language of physiological writers; and so long as we employ these terms merely to import a definite kind or peculiarity of impulse, they may have their use and convenience; but they convey no knowledge, and ought not to be allowed, as I am afraid they sometimes are, to supply the place of knowledge. That the muscles of the jawbone sometimes associate in their action with the muscles of the hand or foot; the organ of the left shoulder with that of the liver; and the stomach, under some kinds of stimulus, with the brain; under others, with the heart; and under a third sort, as all those that excite nausea, with the skin; while the skin, in return, associates very generally with the action of the kidneys, are ascertained and well-established facts; but why they should be facts, or by what power or medium the association is maintained, we are altogether ignorant.

* Appendix to Travels, p. 301. 8vo edit.

When the circulation of the blood was first discovered, it was supposed that all these anomalies might fall within the range of this admirable mechanism, and might be explained by its operation. Not one of them, however, is capable of such an explanation. Nor is even the diffused redness which uniformly takes place around the nucleus of an inflamed part, in any degree more intelligible or more referable to this principle; since, in consequence of the device of a circulating system, the vessels in the immediate vicinity of each other, are as much cut off from all direct communication as those at the remotest distance; and only, so far as we are able to trace by ocular experiment, associate by the common current of the blood. That they do, in fact, associate by other means we know; but it is by means altogether concealed from us: it is by what, as already observed, we call sympathy or fellow-feeling; but what we only call so to express a peculiarity of action, the cause of which we are incapable of penetrating.

There is one curious and highly important discovery in the animal economy, however, that has been made, or rather, completely established, within the last two or three years, which seems to show that such associate action of parts, at a distance from each other, may be the result of a direct intercourse or medium of communication, though the connecting channel is too subtile for pursuit: for it seems now to be ascertained, as it had, indeed, been long suspected, though without

the proof of actual experiment, that a variety of substances pass from the stomach into the kidnies, apparently without entering into the circulation of the blood, by an unknown and even a much shorter course. Now, to the eye of the anatomist, there are no organs more distinct from each other; they not only lie far remote in situation, but even in different cavities, and are separated by a strong, stout membrane, called the peritonæum.

To determine whether such a channel actually existed or not, Dr. Wollaston introduced into the stomach three grains and a half of the salt called prussiate of potash; the presence of which, in almost all kinds of colourless fluids, is capable of detection to the utmost nicety, by mixing with them a small portion of solution of iron, the colourless compound being immediately marked with a blue tinge. The above quantity was given to a healthy person, about thirty-four years of age, and was repeated every hour to the third time. The natural secretion from the kidneys being tested every half hour, was found in two hours to be slightly dyed, and at the end of four hours to afford a deep blue. At this period, just one hour after taking the last dose, and when the blood-vessels might be supposed to be fully impregnated with the material, if it passed to the kidneys through this conveyance, blood was taken from the arm, and allowed to coagulate, so that the serum or limpid part of it might be fully separated. The presence of the prus-

siate was then endeavoured to be discovered, by means of the solution of iron, but without the least effect, for the serum still remained colourless. And in other experiments of a similar kind, made both by Dr. Wollaston and Dr. Marcet, it was satisfactorily ascertained that the prussiate of potash, though it found its way readily to the kidneys, did not exhibit any trace of its existence in the fluid of any other organ whatever, any more than in that of the blood; as the saliva, the mucus of the nostrils, or the limpid discharge produced by blisters. Mr. Home has since shown, that rhubarb introduced into the stomach in like manner finds a path to the kidneys, apparently without passing through the circulating system. *

Mr. Home at one time suspected that the organ of the spleen afforded a passage from the stomach to the circulation of the blood in the cases before us, instead of the lacteal vessels, which imme-

* The only mode by which the present writer can conjecture the possibility of these substances being conveyed to the kidneys by the course of the blood, and becoming manifest in their ordinary secretion, on the application of chemical tests, is, that they may be so minutely decomposed by the action of the blood while passing through it, as to be beyond the influence of any tests whatever; and that they only discover themselves in the renal secretion, in consequence of a peculiar attraction or affinity of the organ for such materials, and their being hereby thrown off in a more concentrated form. But this explanation is, after all, merely conjectural. See Stud. of Med. vol. v. p. 283. 2nd edit.

diately rise from the alimentary canal. This idea, he has, however, since relinquished as erroneous; but had even such a passage existed, it would not have answered the purpose; for it would only have conducted materials by another path to the blood; and the experiments of Dr. Wollaston have sufficiently proved, that the unknown channel, wherever it lies, has no connexion whatever with any part of the system of blood-vessels, or even with the common system of absorbent vessels: and so far he seems to have disproved a previous theory of Mr. Charles Darwin upon this subject, which held, that the absorbent system might become the channel, by assuming a retrograde action. Such action, however, has never been established, and, independently of the experiments before us, it is rendered highly inconceivable, by the known structure of the absorbent vessels themselves.

The corollary, then, resulting from these observations, is, that in the animal system, as well as in inorganic nature, bodies in various instances act where they are not, and through channels of influence or communication, with which we are altogether unacquainted.

The examples thus far offered, in regard to animals, I readily admit, are taken from different parts of the same individual frame: but as they are drawn from parts remotely situated, and whose intercourse, so far as we are able to trace it, is as much cut off as though they were of different frames, excepting, indeed, by a channel,

which does not show itself to be resorted to in the cases before us, I mean the blood; they may serve to lay a ground work for our conceiving the possibility of a similar influence or association of action between different parts of different frames, or, which is the same thing, between living body and living body.

I proceed, then, to offer examples of this latter kind of influence. The subject, I am aware, is not only of a very curious, but of a very delicate nature, and requires to be handled with the greatest dexterity; nor do I know of any philosophical work to which we can turn as a proper beacon to direct us in our pursuit, and to determine where the boundary of sober judgment ceases, and that of imagination begins.

Some of the instances I shall refer to, may, perhaps, be denominated instinctive influences. I have no objection to the term; but the facts will remain as singular, and as little accounted for, as if no such term were in existence.

Among quadrupeds, and, so far as we know of them, among amphibials, fishes, and insects, there exists but little attachment of the male to the female during the time of parturition, or to his own young after the female has brought them forth. The seal-tribes, and especially those of the trichechus *Manatus*, or lamantin, from which we have probably derived all the idle stories of mermen and mermaids, together with a few others, may, perhaps, be offered as an exception; for these, and especially the lamantin, form

unions of single male with single female that continue through life, and live in distinct families with their offspring, till the last, acquiring maturity, leave their paternal home, and found similar families for themselves. Such, then, being the general fact with regard to other animals, whence come it to pass that the males among the bird-tribes should evince, with a few exceptions, an attachment that is so rarely to be met with elsewhere? What is that wonderful power that rivets the greater number of male birds to female birds during the time of nestling and incubation; that impels them to take an equal part in constructing the nest, and stimulates them with feelings unknown at any other season? Whence is it that several of them, as the male raven, (corvus *Corax*), divide the toil and time of sitting, and incubate the eggs by day as the female does by night? or, that others of them, leaving to their respective females the entire process of incubation, soothe them through the whole of this tedious period, often extending to not less than six or eight weeks, with their melodies from a neighbouring bush, and supply them with food with the utmost tenderness and punctuality?

Whence is it, more especially amidst birds that feed their young with a viscid chyle or milk, secreted at that peculiar period in the crop or craw, that the crop of the male becomes enlarged and changed in its action, in the very same manner as that of the female, so as to enable him to divide the tender office of nursing,

and to supply the young with an equal quantity of nutriment? In the body of the mother we can, perhaps, trace a series of actions which, if they do not give us a full insight into the cause of such a change, and such an additional function, at least prepare us to contemplate it with less astonishment; it is a change, in a very considerable degree, analogous to what occurs in the female frame of most other kinds and classes when similarly situated; and which is evinced in its highest and most beautiful perfection in our own race. But in the production of a similar change in the crop of the male pigeon, we meet with a fact altogether anomalous and alone: there is no connexion of organ with organ; no perceptible chain of actions that can have given rise to it: the frames of the individuals are distinct. It is a pure sympathy excited in one being by a peculiar change produced in the organization of another, and leading to a similar change in the being that is thus most wonderfully and inexplicably operated upon.

Let us pass from the bird-tribes to fishes. There are various animals of this class that on being touched, or even approached without being touched, are enabled to exhaust the irritable or sensorial power, or both together, of the hand or other limb that approaches them, so as to paralyse it, and render it incapable of exertion. Such especially, are those fishes which we denominate the torpedo-ray, and the electric eel or gymnote. Of these the former has been

longest known to naturalists; for, in consequence of its being an inhabitant of the Mediterranean sea, it is described both by Greek and Roman writers, who impute its distinctive faculty to magic; and conceive that the animal has a power, not only of concentrating this magical energy at option, but if seized hold of by a fishing-hook, of impelling it through the whole length of the hook, line, and rod, to the arm of the angler, and hence by palsying his arm, of effecting his escape. So Oppian in Greek verses, which I will take leave thus to translate:

> The hook'd torpedo, with instinctive force
> Calls all his MAGIC from its secret source;
> And through the hook, the line, the taper pole,
> Throws, to th' offending arm, his stern control.
> The palsied fisherman, in dumb surprise,
> Feels through his frame the chilling vapours rise,
> Drops the vain rod, and seems, in stiffening pain,
> Some frost-fix'd wanderer o'er the icy plain.*

There may, perhaps, be some exaggeration in this description; but there are not wanting naturalists of modern times who contend that the torpedo is able to throw his benumbing influence to this extent and in this manner. This influence, moreover, is altogether voluntary; and hence the animal will sometimes allow himself to be touched without exerting it. He occasionally loiters on the moist sands of the shore after the tide has retreated, burying himself

* Alieut. i. 412.

under the sand by a brisk flapping of his fins, which serves to fling this material over him; and in this state he is said to inflict at times, even through the sand that covers him, a torpor so severe as to throw down the astonished passenger that is inadvertently walking over it.

We now know something of the medium through which this animal operates, and have no difficulty in referring it to an electric or Voltaic aura, and can even trace a kind of Voltaic apparatus in its structure. Yet, before the laws or power of electricity or Voltaism were known, and, consequently, before the medium by which they act, was followed up, which to this hour, however, is only known by its results, (for it has never been detected as an object of sense,) it is not to be wondered at that so mysterious an energy, operating or ceasing to operate at the option of the animal, and occasionally operating at a distance from the individual affected, should be regarded as a species of magic or incantation.

The Voltaic power of the electric eel or gymnote, is, however, more obvious and effective than that of the torpedo: the gymnote making a sudden and concentrated assault by shocks, of less or greater violence, as though from a more highly-charged battery; and the torpedo, by a numbness or torpor, whence, indeed, its name, produced by small but incessant vibrations of Voltaism, seldom, excepting in severe cases, amounting to the aggregation of shocks, and precisely similar to what is felt in a limb upon

applying to it a great multitude of weak strokes, rapidly repeated from a small battery or Leyden phial. Yet even the peculiar properties of the gymnote were received with the greatest scepticism for nearly a century after their first discovery; which, as this fish is almost exclusively a native of the warmer seas and rivers of Africa and America, did not take place till the middle of the seventeenth century. They were first pointed out to the French Academy in 1671, by M. Richer, one of the travelling professors sent out by the Academy to conduct certain mathematical observations in Cayenne; but were not generally credited till the concurrent experiments of M. Condamine, Mr. Ingram, Mr. Gravesend, and other celebrated natural historians, set every doubt at rest, about a century afterwards.

The more formidable power of the electric gymnote enables it, upon the authority of almost every experimentist, to give not only severe shocks, both in the water and out of the water, when in actual contact with another animal, but to convey them, as we have just observed that the torpedo is said to do, though upon doubtful testimony, through long rods or poles. It is highly probable, however, that such poles must first be wetted with water; for both the gymnote and the torpedo are found to be limited to precisely the same conducting and non-conducting mediums as are met with in common electricity.

In these cases we trace something of the me-

dium by which the irritable or sensorial power is exhausted. There are various other cases, however, in which, to this moment, we are as ignorant, and as little capable of tracing it, as mankind must have been in regard to the animals before us, antecedently to a discovery of the electric aura. And I here particularly allude to the torpid effects produced upon poisonous serpents and scorpions in Africa and America, on their being handled by persons of two different descriptions; the one possessing this torpifying power naturally and hereditarily, and the other, acquiring it by artificial preparation; such as chewing the roots or other parts of certain plants, rubbing them in their hands, or bathing the body in aqueous infusions of them, and thus impregnating the body of the operator with their virtues.

There appears to be no country in the world so much infested with serpents of this kind as the ancient Cyrenaica, or that part of Africa which lies northward of the great desert of Sahara. Among the different tribes that formerly inhabited this region, one of the most celebrated was the Psylli; and as this tribe seems to have been in full possession of this power, either from art or nature, and to have given the strongest and most extraordinary proofs of its having possessed it, all persons capable of exerting a similar effect were denominated Psylli by the Greek and Roman writers. And hence Plutarch tells us, that when Cato pursued his

march through the Cyrenaic desert in search of Juba, he took with him a variety of these Psylli to suck out the poison from the wounds of such of his soldiers as should be bitten by the numerous serpents of the country.

It appears most probable that the Psylli were not naturally protected against this venom, but from long and skilful practice, were acquainted with the virtue of those plants which, as I have just hinted, answer both as a preservative against the bite, and as an antidote after the bite has been inflicted: and, being strongly addicted to divination or pretended magic, as all the historians who have given us any account of them, affirm them to have been, affected to derive their power of subduing poison from this preternatural source alone, and inculcated the belief that they could only exercise it, by muttering or chanting some potent verse or spell over the person who was affected. And hence the disarming a serpent of his capacity of poisoning, or disarming the poison itself of its deadly effect after a wound had been received, was denominated charming or incantation. So Silius Italicus, * in allusion to

* See also Virgil, Æn. vii. 753, in which he ascribes the salutiferous power both to the song and touch of the enchanter.

> Vipereo generi et graviter spirantibus hydris
> Spargere qui somnos CANTUQUE MANUQUE solebat,
> Mulcebatque iras, et morsus arte levabat.

the Psylli, or their neighbours, the Marmarides, lib. iii.

> Ad quorum CANTUS mites jacuêre Cerastes.
> The horned snake lies harmless at their SONG.

This sort of power derived from art or nature, and probably originating in this quarter of the world, appears to have been known in the remotest ages, and to have been uniformly ascribed to the same influence of certain magical words or verses chanted, or uttered in recitative; and it appears also to have been very generally conjectured, that there exist some kinds or species of poisonous serpents that are capable of shutting their ears against the sounds thus uttered, and that will not hearken to or be charmed by the voice of the enchanter, however skilful the enchantment.

The sacred books abound in allusions to this popular tradition*; they are equally to be met with in the writings of the Greek and Roman poets, and even in the Sanscrit moralists, as, for example, in the Hitopadesa of Vishnusarman, probably of a higher antiquity than the psalmist himself, who tells us in his book of aphorisms, that "as a charmer draweth a serpent from his hole, so a good wife taking her husband from his place of torture, enjoyeth happiness with him." †

There are some philosophers and historians, who have ventured to disbelieve that any such

* Ps. lviii. 5.; as also Jer. viii. 17.; Deut. xviii. 11.

† Transl. of Sir William Jones.

extraordinary power has ever been possessed by any people. The very cautious writers of the Ancient Universal History express no small degree of scepticism upon this point *: and M. Denon, one of the chief of the literati that accompanied Bonaparte to Egypt, has been bold enough to laugh at the assertion, and to regard every pretension to such a power as a direct imposture. He offers, however, no sufficient ground for his ridicule, and is flatly contradicted by the concurrent testimony of all the best travellers, both to Africa and South America. Mr. Bruce is very full and very explicit upon the subject. He distinctly states, from minute personal observation, that "all the blacks in the kingdom of Sennaar, whether Funge or Nuba, are perfectly armed (*by nature*) against the bite of either scorpion or viper. They take the cerastes (or horned serpent, being the most common, and one of the most fatal of all the viper tribes) in their hands at all times, put them in their bosoms, and throw them to one another, as children do apples or balls;"† during which sport the serpents are seldom irritated to bite, and when they do bite, no mischief ensues from the wound. The Arabs of the same country, however, he tells us as distinctly, have not this protection naturally; but from their infancy, they acquire an exemption from the mortal consequences attending

* Vol. iii. p. 491. Appendix.

† Travels, Appendix, p. 303.

the bite of these animals, by chewing a particular root, and washing themselves with an infusion of particular plants in water.

The Nuba and Funge, however, or those who are preserved naturally from the bite and venom of the viper and scorpion, are also highly skilful in the knowledge and application of these roots, and other parts of plants, to those who have no natural protection or charm. Mr. Bruce has given a particular account of several of these plants, some of which seem only capable of acting against the power of the serpent, others only against that of the scorpion, and a third sort against both. And in either instance, where they secure against the bite or sting, and thus operate as a preventive or prophylactic, they also secure equally against the poison, when introduced into the system by a wound, and thus operate as an antidote.

In South America the natural charm does not seem to be possessed by any tribe: but the artificial charm, obtained by the use of peculiar plants, is known as extensively, and employed as successfully, as in Africa, and is found to possess the same double virtue of an antidote and a preventive. One of the most satisfactory accounts of this singular fact, is contained in a memoir, drawn up in 1791, by Don Pedro d'Orbies y Vargas, a native of Santa Fe, which details a long and accurate list of experiments which he instituted to ascertain it. The plant chiefly employed by the American Indians, he tells us, is denominated in that part of the world *vejuco*

de guaco, guaco-withy, from their having first observed that the bird of this name, or as Catesby calls it, the serpent-hawk, usually sucks it before it attacks poisonous serpents, and then attacks them without mischief.* Prepared by drinking a small portion of the juice of this plant, and inoculating themselves with it, also, by rubbing it upon three small punctures in the hands, breast, and feet, and thus impregnating the body with its virtues, Don Pedro himself, and all his domestics, were accustomed to venture into the open fields, and fearlessly seize hold of the largest and most venomous serpents. It was scarcely ever that the animal thus charmed or fascinated had power to bite, and when he did so, the wound produced was slight and of no consequence. M. Acrell, in the Amœnitates Academicæ, after mentioning the same plant, tells us that the senega is possessed of a like power. †

Of the truth of the fact, therefore, thus confirmed by the most trusty travellers and historians, in different quarters of the world, there can be no doubt; and it adds to the facility of believing it to find that other animals besides men are possessed of a similar power. Thus the conder and the wild boar feed harmlessly on the rattlesnake, which appears to offer no resistance to their attack, and suffer no injury from its venom after

* It appears to be the ophiorrhiza *Mungos* of Linneus.

† Amœn. Acad. vol. vi. No. 112. Morsura Serpentum 1762.

they have satisfied their hunger. In both these cases, the charm or power of protection appears to be natural, as in the Nuba and Funge tribes of Africa. In the serpent-hawk or guaco, however, just noticed, which derives its chief food from poisonous snakes, and in the tantalus or ibis of Egypt, the numenius *Ibis* of Cuvier, which equally attacks and devours them, the charm or protection seems to be artificial, and to depend upon the virtue of the plant to which they have recourse for this purpose ; for I have already observed that the serpent-hawk uniformly applies to the ophiorrhiza before he commences the battle; while the ibis, though he appears to open the fight without any such preparation, retires from the field, if wounded, to the plant which he knows will serve as an antidote, and immediately renews and continues it till he has vanquished his enemy.

The fact, then, being incontrovertible, we have next to inquire into the secret and invisible cause of so very salutiferous and extraordinary an effect; or rather, into the nature of the medium by which so extraordinary an effect is produced. That there is in all these cases a peculiar emanation issuing from the body of the protected, there is little doubt.

But we have no reason for ascribing it to electricity or voltaism, since the persons thus peculiarly endowed, whether by art or nature, whether temporarily or permanently, exhibit no proofs of an electric power upon any other ani-

mal, or of the same power, whatever it may be, in any other way. It appears, nevertheless, to be a power that operates in a manner somewhat similar to, but in some respects more forcible and more general than that of electricity: I mean by exhausting equally and altogether the muscular and sensorial energy of the serpent or scorpion to which it is applied; for, in regard to the serpent kinds, we are told distinctly, as well in America as in Africa, that they remain totally torpid and inactive beneath its influence; scarcely ever being able to muster up force enough to attempt any resistance, even when eaten up alive, as Bruce assures us he has seen them, from tail to head, like a carrot*; a fact which doubtless could never occur in animals so active and courageous, unless they were secretly deprived of all power of resistance.

We are not left, however, to mere conjecture upon this subject: for Mr. Bruce most positively affirms, that they constantly sicken the moment they are laid hold of, and that they are sometimes so exhausted by this invisible power or fascination, as to perish as effectually, though not so rapidly, as though they had been exhausted by an electric battery, or a stroke of lightning: "I constantly observed," says he, "that however lively the viper was before, upon being seized by any of these barbarians, he seemed as if taken with *sickness, and feebleness*, frequently shut his eyes,

* Travels, &c. Appendix, p. 302.

and never turned his mouth towards the arm of the person that held him."* And in another place, he as expressly asserts, that he has seen the animal die while under the stroke of this invisible influence.

We have here, then, an effect produced, and of the most powerful character, by one animal upon another, without our being in the least degree capable of tracing the medium of operation.

Whether in this case actual contact is absolutely necessary, does not seem to have been ascertained or sufficiently attended to.

In the case of electric fishes, we have already seen it is not absolutely necessary; and in another phænomenon, perhaps of a still more extraordinary nature than any I have yet adverted to, it seems to be still less so, and indeed not at all necessary; I mean the very curious fascinating power of the rattlesnake over various small animals, as birds, squirrels, and leverets, which, incapable of turning off their own eyes from those of the serpent-enchanter, and overpowered with terror and amazement, seem to struggle to get away, and yet progressively approach him, as though urged forward, or attracted by a power superior to that of natural instinct, till at length they enter, apparently without any foreign force, into the serpent's mouth, which has all along been open to receive them, and are instantly devoured.

In the difficulty of accounting for this most

* Travels, &c. App. p. 303.

extraordinary influence, there are some persons who have ventured, as in the preceding cases, to doubt the truth of the fact, since, in the marvellous, it will always be found far more easy to doubt than to determine, though the belief of it has been very generally gaining ground within the course of the last half century. Pennant seems to allow it with some degree of hesitation, admitting, however, the authority of those who have asserted it. Dr. Mead endeavoured to account for it upon the principle of mere terror; my late learned friend, Professor Barton of Philadelphia, upon that of a courageous daring of parent animals in defence of their young, in consequence of which they often adventure too near, and are seized upon; Dr. Barton apprehending that this is a fate which more frequently pursues older than younger animals. Neither of these explanations, however, can be very readily assented to; the first being inadequate to the effect produced, and the second being contrary to the general observations of naturalists who have treated upon the subject: in consequence of which Major A. Gordon, of South Carolina, has since ventured upon another explanation, which is highly ingenious, and may hereafter, perhaps, be fully substantiated. In a paper published by him in the New York Historical Society, he attributes the fascinating power supposed to be possessed by serpents to a vapour which they secrete, and can throw around them to a certain distance at pleasure. He advances

various facts in support of this opinion, and observes, that the vapour produces a sickening and stupefying effect; and alludes to a negro who, from a peculiar acuteness of smell, could discover a rattlesnake at a distance of two hundred feet when in the exercise of this power, from his smell being affected by it; and who, on following such indication, always found some animal drawn within its vortex, and struggling with its influence. *

Should this asserted fact be confirmed by others of a like kind, it will give us an insight into the nature, not only of the present, but of similar fascinations, which we stand much in need of. The greater acuteness of smell in barbarous and uncultivated tribes than in those of civilized nations, we have already had occasion to notice, and have endeavoured to account for. † In some instances it is highly probable that the emanation is alone perceptible by the animals that are overpowered by it; which may be the case in the example of serpent-charmers, and sometimes in the fascination of serpents themselves. In other examples, and especially those of artificial emanations, there is an odour of which every one is sensible, though its captivating power is confined to the particular tribe to which it is directed: and I now allude to the mode of charming trout and other fresh-water

* Journ. of Science, &c. No. xii. p. 374.

† Ser. I. Lect. xv.

fishes, by illining the hand with assafœtida, to which indeed we had occasion to refer in a former lecture. * The trout, in its intoxication of delight, (for here the charm is accompanied with a forcible pleasure instead of a forcible pain,) resigns all caution, becomes dead to its natural instinct, and so far from flying from the ensnaring hand when introduced into the water, advances to it irresistibly, as the bird to the jaws of the rattlesnake, and suffers itself to be laid hold of and fall a prey to the decoyer.

There is, hence, nothing in the accounts of these curious powers of fascination that is hostile to our own experience: and though our own senses may not be fine enough to detect the medium of action in every instance, whether natural or artificial, we have some reason for ascribing it generally to an overwhelming emanation, capable of leading captive the ordinary instincts and faculties of the animals upon which it is exercised, and hereby of hurrying them headlong to destruction. Catesby, the best natural historian of North America, while admitting that he had never witnessed an instance of the fascination of the rattle-snake, asserts that he had received one uniform account of it from a variety of persons who had witnessed it; nor is it, indeed, denied by Dr. Mead or Professor Barton, but only attempted to be accounted for upon principles which will not apply, or are not adequate.

* Ser. I. Lect. xv.

In truth, the rattlesnake does not seem to be the only serpent that is possessed of this extraordinary influence. The American writers contend that the larger snakes of various kinds have a similar power. Dr. Barrow, in his travels into the interior of South America, asserts this to be a fact well known to almost every peasant in that quarter of the world; and Vaillant, in his travels into Africa, affirms that, at a place called Swortland, beholding a shrike in the very act of fascination by a large serpent at a distance, the fiery eyes and open mouth of which it was gradually approaching with convulsive tremblings, and the most piteous shrieks of distress, he shot the serpent before the bird had reached it; still, however, the bird did not fly, and on taking it up, it was already dead, being killed either by fear or by the fascinating influence of the serpent, although upon measuring the ground he found the space between them to be not less than three feet and a half.

M. Acrell, in a very interesting paper upon this subject in the Swedish Amœnitates Academicæ*, contends that the coluber *Berus*, or common viper, is in some degree endowed with the same fascinating power as the rattlesnake. And there is a case much in point inserted in one of the early volumes of the Philosophical Transactions, which states that a mouse, put, by way of experiment, into a cage in which a female viper

* Vol. vi. No. 112. Morsura Serpentum, 1762.

was confined, appeared at first greatly agitated, and was afterwards seen to draw near to the viper gradually, which continued motionless, but with fixed eyes and distended mouth, and at length entered into its jaws, and was devoured.

There is, in truth, a secret kind of influence, but whether of the same kind or distinct from it, we have no means of ascertaining, which other animals possess on particular occasions, and which is even in some cases possessed by man, and is known to disarm the fury of the most enraged or vicious quadrupeds. This is peculiarly seen at times in the case of watch-dogs, over whom some house-breakers have found out the secret of exercising so seductive and quieting a power, as to keep them in a profound silence while the burglary is committed. M. Lindecrantz, another interesting writer in the Amœnitates Academicæ of Sweden, tells us, that the natives of Lapland and Dalarne are in possession of this secret generally, insomuch that they can instantly disarm the most furious dog, and oblige him to fly from them with all his usual signs of fear, such as dropping his tail, and suddenly becoming silent. *

Grooms are sometimes found possessed of a similar power over horses. Mr. Townsend, a clergyman of excellent character, and considerable learning, has a striking anecdote to this

* Vol. iv. No. 53. Canis Familiaris, 1753.

effect, in his account of James Sullivan, a native of the county which forms the subject of his pen. The man, an awkward, ignorant rustic of the lowest class, was by profession a horse-breaker, and generally nicknamed *the whisperer*, from its being vulgarly supposed that he obtained his influence over unruly horses by whispering to them. The actual secret of his fascinating power he kept entirely to himself, and it has died with him. His son, who is in the same occupation, knows nothing of it. But it was well known to every one that, however unbroken or vicious a horse, or even a mule, might be when brought to him, in the short space of half an hour he became altogether passive under his influence, and was not only entirely gentle and tractable, but in a very considerable degree continued so, though somewhat more submissive to himself than to others. There was a little mystery in his plan, but unquestionably no deceit. When sent for to tame an unruly horse, he ordered the stable door to be shut upon himself and the animal alone, and not to be opened till a given signal. This singular intercourse usually lasted for about half an hour; no bustle was heard, or violence seemingly had recourse to: but when the door was opened on the proper sign being given, the horse was always seen lying down, and the fascinator by his side, playing with him familiarly as a child with a puppy. "I once," says Mr. Townsend, "saw his skill tried on a horse that

could never before be brought to stand for a smith to shoe him. The day after Sullivan's half-hour lecture, I went, not without some incredulity, to the smith's shop, with many other curious spectators, when we were eye-witnesses of the complete success of his art. This, too, had been a troop-horse, and it was supposed, not without reason, that after regimental discipline had failed, no other would be found availing. I observed that the animal seemed afraid whenever Sullivan either spoke or looked at him." * In common cases, Mr. Townsend adds, even the mysterious preparation of a private interview was not necessary, the animal becoming tame at once. We have here, therefore, another instance of most extraordinary and instantaneous ascendancy of one animal being over another, without any manifest medium of action, which we are occasionally, but not often, called upon to witness. That it could not have been force is clear; and though natural firmness and intrepidity may do much, they by no means appear to have been sufficient in the present case, and could, indeed, accomplish but little in the dark. Nor does there seem to be any mode of accounting for such a control so reasonable as that of a natural or artificial emanation from the fascinator, which we have already adverted to; and, if the last, obtained, perhaps, as in many of these instances, by illining or impregnat-

* Survey of the County of Cork, p. 438.

ing the person of the operator with the virtues of various plants unknown or little known to the rest of the world.

Thus far we may proceed safely upon the subject before us. But some theorizers have not rested satisfied here, and with much rhapsody of invention, have carried forward the same mysterious agency into the recesses of the intellect, and contended that it is by a similar kind of medium, or, sometimes, by a sort of elective attraction, operating invisibly through the moral world, as the imperceptible powers before us operate in the physical, that mind produces occasionally an instantaneous influence upon mind; whence, say they, we are at times impelled by a certain indescribable sympathy, to feel more pleased with one person of less intellectual and perhaps even less moral worth, than with another person, whose endowments in both respects are confessedly superior: whilst others, pursuing the hallucination still farther, have gravely suggested, that it is possibly by some such medium that an intercourse is occasionally maintained between ourselves and the spirits of our departed friends; between this world and worlds around us. To hunt down such vagaries would indeed be a thriftless employment; and I only mention them to show that philosophy has its dreams and romances as well as history or even poetry; and that the principles of physics are as liable to perversion as those of ethics. Philosophy is a pilgrim, for the most part, of

honest heart, clear foresight, and unornamented dress and manners; the genuine bride to whom heaven has betrothed him is Reason, of celestial birth and spotless virginity; and the fair fruit of so holy a union is truth, virtue, sobriety, and order. But should ever the plain pilgrim play the truant, as unfortunately in the present corrupt state of things we have reason to fear has too frequently proved a fact, — should ever Philosophy migrate from his proper hermitage, and in an hour of ebriety connect himself with the harlot Imagination, what can be the result of so unlicensed a dalliance but a spawn of monsters and miscreations; of hideous and unreal existences; of phantoms and will-o'the-wisps, equally abhorred by God and man; treacherously hanging up their dim wild-fire, in the pestilent bosom of mists and exhalations, and from their murky shades alluring the incautious enquirer to bogs, and sloughs, and quagmires of wreck and ruin?

LECTURE VII.

ON SLEEP, DREAMING, REVERIE, AND TRANCE; SLEEP-WALKING, AND SLEEP-TALKING.

We are proceeding to a subject of much difficulty in theory, though of the greatest familiarity in fact; and I freely confess to you, that although I have endeavoured to investigate almost every opinion that has been offered upon it, from the time of Aristotle to our own day, I have never met with any thing in the least degree satisfactory, or capable of unravelling the perplexities in which it lies entangled.

What can possibly be more opposite to each other than the two states of wakefulness and sleep? — the senses in full vigour and activity, alive to every pursuit and braced up to every exertion,— and a suspension of all sense whatever, a looseness and inertness of the voluntary powers, so nearly akin to death, that nothing but a daily experience of the fact itself could justify us in expecting that we could ever recover from it.

And yet, while such is the lifelessness without, the mind, now destitute of the control of the will, is often overwhelmed with a chaos of ideas, rushing upon each other with so much rapidity, that the transactions of ages are crowded into

moments, and so confused and disjointed, that the wildest and most incongruous fancies flit before us, and every thing that is possible becomes united with every thing that is impossible.

Such, however, are the ordinary means devised by Infinite Wisdom to revivify the animal frame when exhausted by the labours of the day; to recruit it for new exertions, and enable it to fill up the measure of its existence.

The order I shall take leave to pursue in discussing this abstruse subject will consist, first, in a brief examination of the more prominent hypotheses on sleep and dreaming that have been offered to us by ancient and modern schools: secondly, in a minute analysis of the feelings and phænomena by which these operations are characterized, agreeably to the series in which they occur: thirdly, in submitting the outline of a new theory to explain the entire process: and lastly, in an application of such theory to a variety of other subjects of a similar and equally extraordinary nature.

Sleep may be either natural or morbid. The former is usually produced by whatever exhausts the principle of life; as great muscular excitement, violent pain, vehement use of the external senses; or great mental excitement, as intense thought or severe distress. Morbid sleep is commonly occasioned by compression or commotion of the brain, and is hence often the result of congestion, plethora, or local injury to the skull.

Compression and commotion, though less fre-

quent, are more direct and obvious causes: and hence the greater number of physiologists believe compression to take place also, though in a slight degree, in every case of natural sleep; and in reality to constitute the immediate, whilst sensorial exhaustion only constitutes the remote, cause of this phænomenon. They appeal to the lethargic effect of a full stomach in infants, and of drunkenness in adults, which they refer to congestion in the brain, in consequence of a greater influx of blood into this organ: and hence they reason that a similar sort of pressure is produced by some means or other in every case of sleep.

But what are the means of pressure thus referred to? And here a considerable difficulty is felt by every school of physiologists: and two distinct schemes are devised to get rid of it. By the one we are directed to the arterial system, which we are told, becomes peculiarly excited and overcharged in the organ of the brain during wakefulness, from the activity of the internal senses.* By the other we are directed to the absorbent system, which from the same

* This explanation is partly, though not chiefly adopted by the author of the elaborate article on sleep, in Rees's Cyclopædia; and has since been fully embraced by Mr. Carmichael in his learned Essay on Dreaming. See Transactions of the Association of Fellows, and Licentiates of the King's and Queen's College of Physicians in Ireland, vol. ii. p. 48. 8vo. 1819. Dubl. His explanation of dreaming is that of Gall and Spurzheim, which the reader will find adverted to subsequently.

activity is said to become worn out and rendered torpid in the same organ; and, hence, to be incapable of carrying off the fine fluid which is perpetually exhaling from the secernent vessels into the ventricles of the brain.

Nothing, however, can be more unfounded than both these conjectures, and it is difficult to determine which of the two is the most so. But we are in no want of either of them, for we are in no want of the pressure which they are invented to account for. The principle of exhaustion alone will, I trust, be found sufficient to answer every purpose as a general cause of natural sleep; and, were it possible for us to add that of local pressure, the sleep would no longer be natural, but morbid.

Before we proceed further, however, I will just hint that Dr. Cullen supposes the nervous fluid or power to be disposed by nature to an alternating state of torpor and mobility.* He does not admit that it is ever exhausted and restored as a secretion †; and hence in sleep it is only suspended: and in consequence of this suspension the exercise of sense and volition is suspended also. ‡ Narcotics do not, therefore, in his view, exhaust, but only suspend the nervous power or fluid, and thus induce sleep, which consists in such suspension. The apparently stimulant power of narcotics, he derives from the vigilant exertion of the vis medicatrix na-

* Materia Medica, ii. 226. † Id. p. 223. ‡ Id. p. 226.

turæ,—the instinctive effort of nature, to guard against such suspension of vital power as essentially mischievous, and, when carried to an extreme, fatal: and hence, narcotics are with him directly sedative, but only indirectly stimulant. He supposes both sleep and waking to take place upon each other merely by a law of alternation: an explanation that will satisfy few.

But the chief attention of physiologists, both ancient and modern, has been directed to the subject of dreaming, which has usually but erroneously been regarded as a distinct process from that of sleeping. Let us next, therefore, as briefly as may be, and before we enter into a direct analysis of the phænomena that successively arise, take a glance at a few of the conjectures by which *dreaming* has hitherto been accounted for.

Among the Greek philosophers we meet with two explanations that are worthy of notice; that of Epicurus, because of its ingenuity, and that of Aristotle, because it has descended to the present times.

According to the Epicurean hypothesis of sensation, all the organs of external sense are stimulated to their appropriate functions, by the friction of an effluvium or emanation thrown off from the body perceived. This doctrine, which still holds good, and is uniformly employed in modern times to explain the senses of taste and smell, was equally extended by Epicurus to those of sight and hearing: the former being supposed

to depend upon an effluvium of exquisitely fine films, images or SPECIES, as they were technically called, perpetually issuing in every direction from every existing substance, somewhat in the manner in which snakes and grasshoppers cast off their skins annually, but almost infinitely finer, and altogether invisible. And as these rush against the eye, they were conceived to convey to it a perfect image of the object from which they are ejected. While sound was supposed to be excited in like manner by particles of a peculiar kind thrown off from the sonorous body, and rousing the ears by their appropriate stimulus.

These effluvia of every kind were conceived to be so exquisitely attenuate that they can pass, as light, heat, or electricity does, through a variety of solid bodies, without being destroyed in their passage. The effluvia or pellicles of vision were supposed not unfrequently to arise from the very bodies of those that have been long buried; and to be capable not only of transpiercing the soil in which they are inhumed, and of stimulating the organs of external sight, but of winding through the substance of the flesh, and of stimulating the soul itself in the interior of the animal frame, especially when in a state of sleep, in which the external sense is closed, or of deep abstraction, in which it is inattentive; and thus of presenting to the soul in its naked state, as it may be called, pictures of objects no longer in existence. And hence these philosophers with

great ingenuity, though, as it now appears, with great incorrectness, undertook to solve many of the most difficult problems in nature; accounted for the casual appearance of spectres in the gloom of solitude and retirement, and directly unfolded to the world the "stuff that dreams are made of."

It is needless to point out the errors of this system, for it has long sunk into disuse, never to rise again. And I shall therefore proceed to the rival hypothesis of Aristotle, which, though equally unfounded in fact, has been fortunate enough to descend to modern times, and to have met with very powerful advocates in M. Wolff* and M. Formey.† It was the doctrine of Aristotle, that external sensations not only produce by their stimulus a variety of INTELLECTUAL FORMS or images in the sensory, somewhat similar to the ideas of Plato, and for all practical purposes not very dissimilar to what is meant by ideas in the present day, but that these forms or ideas are themselves capable of producing another set of forms or ideas, though of a more airy and visionary kind:

> As every shadow has itself a shade.

And to this secondary set, these slighter and more attenuate pictures of things, he gave the name of PHANTASMS. In the opinion of this philosopher, dreams consist alone of these phantasms, or mere

* Psychol. Empir. sec. 123.

† Mem de l'Acad. de Berlin, ii. 316.

creatures of the imagination, first excited by some previous motion or sensation in the brain, and afterwards continued in a more or less perfect series, according to the power of the imagination itself. The only difference I am able to trace between this theory, as started by Aristotle, and as restarted by Wolff, is in the greater regularity that the latter assigns to the phænomena of dreaming, than the former does: M. Wolff believing them to be, in their commencement, excited by a sensation, and in their succession and series of representations to be as much controlled by a peculiar system of laws, as the motions of the heavenly bodies. Formey appears to carry this point a little farther: his language is, if the dream be natural, it must necessarily originate agreeably to the law of sensation, and be continued by the law of imagination; and hence he concludes those dreams to be supernatural, which either do not begin by sensation or are not continued by the law of imagination.

It may be sufficient to remark upon this theory, first, that the phantasms of Aristotle have as little claim to entity as the species of Epicurus; next, that the assumption of a code of laws, or rather of two distinct codes of laws to regulate the fleeting train of our ideas in dreaming, is in itself altogether visionary and gratuitous; and that if the term *chance* or *fortuitousness*, a very useful term and full of meaning in all languages, can with propriety be applied to

any thing, there is no subject to which it can be better applied than to that of dreaming; in which the will, the only legislator and controller of our ideas, has withdrawn its authority, and left the brain to a temporary lawlessness and misrule. And lastly, that the distinction which is thus attempted to be drawn between natural and supernatural dreams, is not only altogether fanciful, but could never be of any possible avail, even if well founded; for, in order to distinguish between the two, it would be necessary to be intimately acquainted with those laws of sensation and imagination which are here stated to regulate our natural dreams, and the suspension of which produce dreams of a superior character.

We are touching upon a delicate, and perhaps a dangerous enquiry; but as it has been boldly handled in modern times, and made the foundation of a more daring speculation upon the subject, it must not be flinched from in our present discussion. That total absence of all natural law, which M. Formey supposes occasionally to take place in the act of dreaming, and to distinguish the supernatural from the natural vision, Mr. Andrew Baxter *, and, since his time, Bishop Newton, conceive to take place in every instance of dreaming; and hence, that dreaming is at all times, and on all occasions, a

* An Inquiry into the Nature of the Human Soul, wherein the Immortality of the Soul is evinced from the Principles of Reason and Philosophy, 4to. 1730.

supernatural operation. These excellent men divide dreams into two kinds, good and evil; and conceive two kinds of agents, good and evil spirits, employed in their production; and consequently account for the one or the other sort of dreams, in proportion as the one or other kind of agents obtains a predominancy.

Now it must be obvious that this conjecture is just as destitute of all tangible basis as either of the preceding; that it can make no appeal to facts submitted to the senses. But, beyond this, its very foundation-stone consists of a principle that no man can readily grant who maturely weighs its full import; namely, that dreaming is altogether an unnatural operation; that nearly one half of our lives is spent in a direct intercourse with invisible beings; and that during this moiety of his existence, man is no longer a free agent; his whole train of thoughts and ideas being not loose and dismantled, but run away with by foreign compulsion, and the work of a demoniacal possession.

The difficulties into which such an explanation throws its adherents, are incalculable. Let us confine ourselves to one more example. There can be no doubt that other animals have their dreams as well as man; aad that they have them as vigorous and as lively. Every one has beheld his favourite dog, while asleep by the fire-side in the winter season, violently stretching out his limbs, howling aloud, and at times starting abruptly, beneath the train of images of which

his dream is composed. In what manner will such philosophers account for these various phænomena? Is dreaming a natural operation, or are good and evil spirits the natural attendants upon dogs and cats, as well as upon mankind? The one or the other of these conclusions must follow; and there can be no difficulty in determining which of them will possess the general suffrage.

That dreams, like every other occurrence in nature, may occasionally become the medium of some providential suggestion, or supernatural communication, I am by no means disposed to deny. That they have been so employed in former times is unquestionable; and that they have been so employed occasionally amongst all nations in former times, is highly probable; and the peculiar liveliness with which the trains of our dreaming ideas are usually excited, and from a cause which I shall presently endeavour to explain, seems to point out such a mode of communication as peculiarly eligible. But I am at present attending to the natural phænomena alone, and can by no means enter into a consideration of such foreign interference, which, as it certainly has been, may still therefore be, for all we can prove to the contrary, occasionally introduced into them.

In what may be called our own times, there are many valuable writers who have turned their attention to this curious subject, and who concur in the two following important positions.

First, that the faculty, or at least the action of the will is suspended during the influence of sleep: and, secondly, that in consequence of this suspension or discontinuance, the trains of ideas which persevere in rushing over the mind, are produced and catenated by that general habit of association which catenates them whilst we are awake. The power of the will, it is contended, is not necessary to the existence of ideas, which, therefore, may continue whilst such power is in a state of abeyance; but which, if they continue at all, must take the general order and succession imprinted upon them by the law of association, excepting in cases in which such law is broken in upon by a variety of incidental circumstances, as uneasiness arising from a surcharged stomach, or other bodily sensations.

Such are the two fundamental principles upon which the theories of Hartley, Darwin, and Dugald Stewart, are respectively built; and which, in various ways, and with almost equal ingenuity, they seem very satisfactorily to have established. But there is still a very important question, and which, indeed, constitutes the chief difficulty of the subject, and that which none of them have attempted to answer, or at least have satisfied themselves upon while making such attempt. I mean, whence comes it to pass that ideas can at all exist in the brain during sleep, or that all the internal senses are not as much locked up as the external senses, and the faculty of the will?

In the course of the present lecture it will be my endeavour to account for this most curious phænomenon. But we must first follow up, in the series in which they appear to arise, the train of circumstances which accompany sleep and dreaming. The entire study is highly interesting, but requires close attention, in order to its being fully comprehended. And when we have advanced thus far, we shall obtain a clue, if I mistake not, to those equally abstruse and intimately connected subjects, sleep-walking, revery, and winter-sleep; as well as to various other obscurities that ramify from the same source.

The fibres distributed over the moving organs of animals, I have already had occasion to observe, in a preceding lecture *, are of two sorts: those of the nerves, which are called sensitive fibres, and those more properly belonging to the muscles, which are called irritative fibres; which last, however, are always accompanied by a greater or less number of the former; by which, indeed, they become endowed with the sense of touch, as well as are rendered capable of contributing to the other external senses, and of maintaining a communication with the brain, from which the sensitive fibres issue, or in which they terminate.

Both these kinds of fibres become fatigued, exhausted, and torpid, in proportion to the length and violence of their exertion, and recover

* Vol. I. Ser. I. Lect. x. p. 250.

their power alone by rest. The weariness and flaccidity of the muscles of the arms or legs after extreme exercise, or exercise to which they have not been accustomed, may be adduced as a sufficient proof of the truth of this position.* In like manner, we neither hear, nor see, nor taste, nor feel, with the same accuracy, after any or

* The principles of the theory here advanced were first given to the world by the author as far back as 1805, in the comment subjoined to his Translation of Lucretius, where the poet is treating of the cause and phænomena of sleep; and may be found in vol. ii. p. 137—141. of that work. Several of the doctrines there laid down have been since advanced in various forms by different writers, though in some cases, very probably, without their having perused his explanation. Thus the immediate cause of sleep, advanced in the present passage, is that chiefly rested upon by the author of the article on sleep in Dr. Rees's Cyclopædia, though he also adverts to an occasional increased action in the vessels of the brain as a concurrent cause. And thus much of the explanation which will here be found to follow, respecting the nature and phænomena of dreaming, have still more lately been offered to the world by Dr. Spurzheim, and adopted from him by Mr. Carmichael of Dublin, with the exception that they have interwoven such views with their peculiar doctrine of a plurality of organs in the brain; which, for reasons that will be given in a subsequent Lecture (Vol. III. Ser. III. Lect. XIII.), the present author cannot admit; and does not conceive is by any means necessary on the present occasion. — Such coincidences of opinion, however, and especially if they should be accidental, and not derived from his comment on Lucretius, give a considerable degree of confirmation to the general basis on which the theory rests. The Lecture, as now published, was delivered in the spring of 1811.

all the organs of these various functions have been long upon the full stretch of action, with which we do on their first exertion in the morning. Increase or prolong this action, and their power will be still farther obtunded, till at length, like an over-wearied limb, they become perfectly inert and insensible, and give no account of whatever is passing around us; and it is this general torpitude or inaction of all the external senses, which we call SLEEP. By the exercise of the will, or by any other strong stimulus, this sleep or sensorial torpitude may be postponed; and, *vice versa*, by the consent of the will, it may be accelerated.

This, however, is sleep in its first or simplest shape alone: it is that which I shall take leave to call SLUMBER, and is the mere sleep, or torpitude of the organs of external sense; the will being drowsy, indeed, but still continuing in some degree awake: whence the sleeper, if he lie or sit in any uneasy position, exercises his muscles, which are still under the control of the will, and the position is changed. The other internal senses also, as those of memory, imagination, and consciousness, are in like manner, in a greater or less degree awake; whence the mind is yet filled with ideas, that crowd upon one another with about an equal degree of regularity and confusion: and, if we be spoken to in this state, we return an answer, which intimates indeed that we have heard; but, by its incongruity with the observations made to us, intimates

also that the will has, in some degree, lost its control;—that it has become drowsy, and is affected by the slumber of the organs of external sense.

If the general exhaustion be not very considerable, as after dinner, or during the digestion of any other meal, the sleep may not extend beyond this first or simple stage of slumber; though it should be observed that, from the power of association, the internal and external senses have a strong tendency, if in health, to concur or catenate in one common state or action. When the one are in full vigour, the other are usually in full vigour also; and when the one become drowsy, the other incline to the same drowsiness. But if the general exhaustion be more violent than we are now contemplating, the internal senses will unquestionably concur in the effect, and evince, in some or all of them, an equal degree of sleep.

The first of the internal senses that becomes thus influenced is the will itself. It would be easy to show, if we had time, that the will is infinitely more disposed to catenate with the motions of the external senses than any of the other faculties of the mind. It hence gives way first of all, and sleeps along with the exterior organs, while the other faculties of the mind remain awake. We are now arrived at the second stage of sleep; and it is this which we call and which constitutes DREAMING. The will catenates in the sleep of the organs of exterior

sense ; but all the interior senses, except the will, are still awake. Hence we have ideas of memory, ideas of consciousness, ideas of imagination, ideas of reasoning; but, destitute of a controlling power, they rush forward with a very considerable degree of irregularity, and would do so with the most unshapeable confusion, but that the power of association still retains some degree of influence, and produces some degree of concert in the midst of the wildest and most extravagant vagaries. And hence that infinite variety that takes place in the character of our dreams; and the greater regularity of some, and the greater irregularity of others.

But the general fatigue and exhaustion may be still more violent; and it may also be produced by motions in which the internal senses have principally co-operated : and in such cases, not the will only, but the whole of the internal senses concur in the common torpor or inertness that is produced; and we now advance to a third state, which I shall beg leave to call LETHARGY : dead, senseless sleep, or a stage of sleep without thought or idea of any kind, but still natural and healthy; the vital organs, though none but the vital organs, still continuing their action.

It has been a question often proposed, whether the mind ever does, or ever can, exist without thinking ? But it can only have been proposed by persons who have not paid a due attention to a variety of phænomena, which are perpetually

occurring, and which must be conclusive as to the fact. The mind of an infant, or rather of a fetus, must anticipate the thoughts or ideas that are afterwards introduced within it. In a complete paroxysm of apoplexy, no man has ever been conscious of a single thought or idea; in sleepy coma or lethargy in fevers, as opposed to restless coma, the same discontinuity of all thought and idea takes place uniformly; and we meet with it perhaps still more incontrovertibly in all cases of suspended animation from drowning, hanging, or catalepsy. I enter not into an explanation of this state of being; I only advert to the fact: though if we had time I do not think it would be impossible to suggest an explanation that might be satisfactory to every one.

Thus far we have left the vital or involuntary organs, those over which the will exercises no control, in a state of wakefulness, though none but the involuntary organs. For these, in the first place, are far less subject to exhaustion than the organs either of external or internal sense; their actions in a state of health being always more equable and uniform: and hence, secondly, from an independence most wisely ordained, and productive of the utmost benefit to the general system, they never catenate with any other actions, except in cases of extremity. Upon an application, however, of very strong stimuli, whether external, as those of severe pain or labour, or internal, as those of disease or excessive grief, the vital or involuntary organs them-

selves are fatigued and exhausted; and when the exhaustion is complete, they also, like the organs of external sense, sleep or become torpid: in other words DEATH ensues, the living principle ceases, and the spirit separates from the body. The resemblance, therefore, between DEATH and SLEEP is not less correct upon the principles of physiology, than it is beautiful among the images of poetry. SLEEP is the DEATH or torpitude of the voluntary organs, while the involuntary continue their accustomed actions. DEATH is the SLEEP or torpitude of the whole.

Every organ of the animal frame recovers from its fatigue or torpor by rest, provided the principle of life continues. Hence the organs of external sense, in a definite period of time, and a period generally proportioned to the degree of their exhaustion, re-acquire their accustomed vigour, are *alive* to the influence of their appropriate stimuli; and the smallest excitement applied to any one of them, throws the whole once more into action, in consequence of their habit of acting associately and by common consent. In other words, the man awakes from SLEEP; he rouses himself from the temporary DEATH of the organs of external sense. Were it possible for the principle of life to continue during a total rest or torpitude of the vital or involuntary organs, as it does during that of the voluntary, there can be no doubt that these also would, in time, recover from their exhaustion; and that the man would, in like manner, awake from the total tor-

pitude, the sleep or death of the entire frame; but this in man, excepting under very particular circumstances, and circumstances I shall advert to presently, is impossible. The rule of nature is that as soon as the vital or involuntary functions are discontinued, the principle of life ceases; the soul deserts the body; the laws of chemistry, hitherto held in subjection by a superior control, assert their authority; and the whole visible system falls a prey to corruption and ruin.

When the organs of external sense have recruited themselves by repose, I have already observed that the stimulus that rouses the one, rouses at the same time the rest, from a habit of association. From the same habit, the torpitude produced by exhaustion in any single organ is propagated through every other, and the sleep becomes common to the whole: although it is also unquestionable that the whole are fatigued, or partially exhausted, in consequence of the general stock of sensorial power having been borrowed, in a considerable degree, from the rest, and expended at a single outlet.

The sensitive fibres of the organs of external sense are equally affected, and of course become equally exhausted, whether a stimulus be applied at the one end or at the other, the end terminating externally or that connected with the brain: and hence, internal excitements, as those of severe study, intense grief, undue eating

or drinking, or febrile diseases, produce the same effect as causes operating from without.

In either case, the sleep or torpitude produced is sound or healthy under a certain degree of exhaustion alone: hence, mankind sleep most refreshingly after moderate or accustomed fatigue, moderate or accustomed study, moderate or accustomed meals.

If the stimulus be a little increased beyond this medium, an undue and morbid proportion of sensorial power is secreted, which postpones, indeed, the torpitude or sleep for the present, but at the expence of the general strength of the system, and an expence to which the vital organs themselves contribute something: whence a far deeper and heavier sleep or torpitude ensues than would have ensued with a less proportion of fatigue. If such torpitude take place before the vital organs are totally exhausted, it is confined to the organs of sense alone, which hereby progressively recover their accustomed activity and vigour. But if the vital organs be also exhausted before the torpitude ensues, it will be propagated to themselves, the living principle will cease, and the sleep will be the sleep of death. Violent and continued pain or labour, as external stimuli, violent and continued fevers, violent and continued grief, a very inordinate debauch, as internal stimuli, are all liable to produce these effects; and the one or the other will take place in proportion to their excess and extremity.

If a stimulus affecting the organs of sense, at which end soever applied, be intolerably pungent or forcible, the sensorial power will be exhausted immediately, and the organ directly affected will become instantly torpid. Hence sounds, intolerably loud, make us deaf; excessive light blinds us; acrimonious smells or savours render us incapable of smelling or tasting. And hence an abrupt shock of joy or grief, a sudden and intense paroxysm of fever, large quantities of wine or spirits, as internal causes, produce morbid lethargy, palsy, apoplexy, which are only so many modifications of the sleep, or torpitude of the sensitive and irritative fibres. If the same abrupt and violent cause be sufficient to act upon the vital organs, as well as upon those of external sensation, the torpor becomes universal, and the sleep is once more the sleep of death. It is in this manner that death is produced by a stroke of lightning.

As violent stimuli produce sudden and occasionally irrecoverable torpitude, either general or local, stimuli less violent induce a tendency to the same effect. Hence the nostrils of persons not accustomed to snuff are more forcibly agitated by its application, than those that have been in the use of it: the eyes of persons accustomed to sleep in the glare of the sun, find no inconvenience from exposure to the light of the morning; while those who usually sleep in total darkness are awoke by its stimulus. And so of the rest.

On this account a very small portion of light, of sound, or of exercise, are sufficient sources of exhaustion to those who are not in the habit of using great external or internal activity. Hence savages, and quadrupeds, who use but very little internal activity, and no more external activity than is necessary to gratify their passions and satisfy their hunger, become torpid upon very slight excitements. Hence infants become exhausted upon still slighter excitements; as the exercise of being carried, the mere breath of the air, or the digestion of milk alone in the stomach; either of which, but especially the whole collectively, is sufficient to make them sleep soundly: — so soundly, indeed, that no common stimulus is able for a long time to rouse them from their torpor. In other words, it requires a period of many hours for the external organs to recover from their exhaustion. The smallest undulatory motion in the uterus, perhaps, or the very action of the vital organs themselves, may be sufficient to wear out, from time to time, the sensorial power of the fetus on its first formation: and hence the fetus sleeps, with few intermissions, through the whole period of parturition.

For the same reason, persons in advanced age are far less impressed by common stimuli than in any former part of their lives; from a long series of exposure to their influence, the organs of sense are become more torpid, and hence they require less sleep, and at the same time less food. The vital organs partake of the same

disposition, and they are in consequence less liable to violent or inflammatory disorders. But the general torpitude increasing, the heart is stimulated with greater difficulty; a smaller portion of sensorial fluid is secreted by the brain; a smaller portion of nutriment is thrown into the circulation from the digestive organs; the pulse and every other power gradually declines, till at length, if ever man were to die of old age alone, he would die from a total torpor or paralysis of the heart. But debilitated as every organ is become long before such a period can arrive, the general frame is incapable of resisting the smallest of the more trivial shocks, whether external or internal, to which man is daily exposed: in other words, there is no reservoir of sensorial power to supply the local or temporary demand; and the man dies, even at last, from sudden exhaustion, rather than from progressive paralysis.

Sleep, then, is a natural torpitude or inertness, induced upon the organs of the body and the faculties of the mind, by fatigue and exhaustion; and, in a physiological survey, consists of the three stages of slumber, dreaming, and lethargy. In slumber, the exhaustion is slight, and is almost confined to the organs of external sense, the will only inclining to their inertness: in dreaming, the exhaustion is usually more considerable, the will altogether associating in their inertness: in lethargy, the exhaustion extends to and embraces the mental faculties. When

the system is under the influence of disease, the usual course of the phænomena of sleep and dreaming is often disturbed and interrupted; and when the torpitude extends to the vital organs, the effect produced is death.

But the chief difficulty in the subject of dreaming remains still to be accounted for. How is it possible for thoughts or ideas to exist in the brain, and be continued while the will, which usually regulates them, and the external senses which give birth to them, have their continuity of action broken in upon? I shall endeavour to explain this difficulty in language as familiar as I can employ.

A certain, but a very small degree of stimulus applied to any of the cerebral fibres of the human body, whether sensitive or irritative, instead of sensibly exhausting them, seems rather to afford them pleasure; at least the fibres are able to endure it without becoming torpid, or which is the same thing, requiring sleep or rest.

Hence every gentle sight, and every gentle sound, or any other gentle object in nature, to what sense soever it be directed; the still twilight of a summer evening; the mild lustre of the moon, interwoven with the foliage of forest-scenery; the reposing verdure of a spreading lawn; soft playful breezes; the modest fragrance of roses and violets; the light murmurs of a rippling stream; the tinkling of a neighbouring sheep-fold, and the sound of village bells at a distance, are all stimuli that produce no sensible

exhaustion; and, on this very account, form some of the most agreeable images in nature. In like manner, the orbicular motion of the lips in a sucking infant, is a source of so much comfort, and attended with so little exhaustion, that whether sleeping or waking, it will generally be found mimicking the action of sucking, when at a distance from its nurse; and, perhaps, not thinking of such action itself. A person who, from habit, has acquired a particular motion of any one of his limbs, a twirl of the fingers, or a swinging of one leg over the other, perseveres in such motion from habit alone, and feels no torpitude or exhaustion in the fibres that are excited, although it might be intolerably fatiguing to another who has never acquired the same custom.

It is probable, then, that thought, and the action of the vital organs, are of this precise character. We are totally ignorant, indeed, of the mysterious mode by which either the one or the other was produced at first; but we see enough to convince us that the stimulus is, in both cases, equally pleasing and gentle. And hence both actions continue without exhausting us, except when unduly roused; and form a habit too pertinacious to be broken through by any ordinary opposition.

Thought, then, is to the sensory that which the motions I have just spoken of are to the muscles which are the subjects of them. Both continue alike, whether we be reflecting

upon the habit or not: but the habit of thinking is so much older, and consequently so much deeper rooted than that of any kind of muscular motion, except the muscular motion of the vital organs, that it is impossible for us to subdue it by the utmost efforts of the will: whence, like the action of the vital organs, it accompanies us, not only at all times when awake, but in all ordinary cases during sleep, and is the immediate and necessary cause of our dreaming.

Thought can only be exercised upon perceptions introduced into the sensory by the organs of external sense; and hence the chief bent of our thoughts must be derived, whether sleeping or waking, from the objects or perceptions that most deeply impress us. The train of thoughts, then, that recurs from habit alone, as in sleep or total retirement from the world, must generally be of this description: in the former case, however, by no means correctly or perfectly; because, there are others also which have a tendency to recur, and neither the will nor the senses are in action to regulate or repress them. Whence, as I have already observed, proceeds a combination of thoughts or ideas, sometimes only in a small degree incongruous, and at other times most wild and heterogeneous; occasionally, indeed, so fearful and extravagant as to stimulate the senses themselves into a sudden renewal of their functions, and consequently to break off abruptly the sleep into which they were thrown.

Let us pursue this train of reasoning, and it will

lead us to account, if I mistake not, for some of the most extraordinary facts that are connected with the recondite subject of sleep and dreaming.

I have just observed that the stimulus of our ideas in dreaming is often sufficient to rouse the external senses generally, and to awake us all of a sudden. But this stimulus may also be of such a kind and just such a strength, as to excite into their accustomed action the muscles of those organs or members only which are more immediately connected with the train of our dreams, or incoherent thoughts, while every other organ still remains torpid. And hence, the muscles chiefly excited being those of speech, some persons talk; and others, the muscles chiefly excited being those of loco-motion, walk in their sleep, without being conscious on their waking of any such occurrence.

Whatever be the set of fibres that have chiefly become exhausted from the labour or stimulus of the day, the rest, as I have already noticed, partake of the torpitude from a habit of association; exhausted in some degree also themselves, by the share of sensorial power which, as from a common stock, they have contributed towards the support of the debilitated organ. But it sometimes happens, either from disease or peculiarity of constitution, that all the organs of external sense do not associate in such action, or yield alike to the general torpor of the frame: and that the auditory, the optical, or some other

sense, continues awake or in vigour while all the other senses are become inert; as it does also that such particular sense, like the muscles of particular members, as observed just above, is awoke or re-stimulated into action in the midst of the soundest sleep, by the peculiar force and bent of the dream, while all the rest continue torpid.

If the organ of external sense thus affected with wakefulness be that of *hearing*, a phænomenon may occur which has often been noticed as far back, indeed, as the times of the Greek and Roman poets, but which has never hitherto, I believe, been satisfactorily explained; the dreamer may in this case hear a by-stander who speaks to him; and if, from a cause above specified, he should also have happened to talk in his sleep, so as to give the by-stander some clue into the train of thoughts of which his dream is composed, a conversation may be maintained, and the by-stander, by dextrous management, and the assumption of a character which he finds introduced into the dream, may be able to draw from the dreamer the profoundest secrets of his bosom; the other senses of the dreamer, instead of hereby rousing to detect the imposition, being plunged into a still deeper torpitude, from the demand of an increased quantity of sensorial power to support the exhaustion which the wakeful or active organ is, in consequence, sustaining. This, however, is a case of rare occurrence, though it seems to have occurred occasionally.

If the wakeful organ be that of *sight*, and the dreamer, from a cause just adverted to, be accustomed to walk instead of to talk in his sleep, he will be able to make his way towards any place to which the course of his dream may direct him, with perfect ease, and without the smallest degree of danger. He will see more or less distinctly, in proportion as the organ of sight is more or less awake; yet from the increased exhaustion, and of course increased torpor of the other organs, in consequence of an increased demand of sensorial power from the common stock to support the action of the sense and muscles immediately engaged, every other sense must necessarily be thrown into a deeper sleep or torpor than on any other occasion. Hence the ears will not be roused even by a sound that might otherwise awake him; he will be insensible, not only to a simple touch, but to a severe shaking of his limbs; and may even cough violently without being recalled from his dream. Having accomplished the object of his pursuit, he may safely return, even over the most dangerous precipices, for he sees them distinctly, to his bed; and the organ of sight, being now quite exhausted, or there being no longer any occasion for its use, may once more associate in the general torpor, and the dream take a new turn, and consist of a new combination of images.

The view we have thus taken of sleep and dreaming will explain a variety of other curious

phænomena in natural philosophy, which have usually been supposed of very difficult elucidation.

What is REVERY? It is the dream of a man while awake. He is so intently bent upon a particular train of thought, that he is torpid to every thing else: he sees nothing, he hears nothing, he feels nothing; and the only difference between the two is, that in common dreaming, the sensitive and irritative power of the external senses is exhausted progressively and generally, while the will partakes of the exhaustion; and that in revery the whole is directed to a single outlet, the will, instead of being exhausted, being rivetted upon this one point alone; and the external senses being alone rendered torpid from the drain that is thus made upon them to support the superabundant flow of sensitive and irritative power expended upon the prevailing ecstasy.

It was my intention to have cited a few singular instances of this wonderful aberrancy of the mind; and to have followed them up with a momentary glance at those interesting subjects so closely connected with it night-mare, delirium, madness, idiotism; but the time will by no means allow me, and I hasten to close with a few observations upon winter-sleep and the revivification of certain animals after their appearing to be dead.

Upon a general survey of the preceding observations, it should follow that every part of the

animal system may safely sleep or become torpid except the vital organs, or those that act independently of the will; and that the moment these participate in the torpor the principle of life ceases, and the spirit separates from the body. Why the principle of life should even then cease we know not, for we know not what produced its union at first. There are various circumstances, however, which prove that this, though a general rule, is not a rule without its exceptions. We have all heard and read of such extraordinary occurrences as trances, or apparent absences of the soul from the body: we have heard and read of persons who, after having been apparently dead for many days, and on the point of being buried, have returned to a full possession of life and health; and although most of these histories are wrapt up in so much mystery and superstition, as to be altogether unworthy of notice, there are many too cautiously drawn up and authenticated to be dismissed in so cursory a manner. But let us proceed to a few facts of a similar, yet of a more extraordinary kind, and which are or may be within the personal knowledge of every one.

In cases of suspended animation by hanging, drowning, or catalepsy, the vital principle continues attached to the body after all the vital functions cease to act, often for half an hour, and sometimes for hours. In the year 1769, Mr. John Hunter, being then forty-one years of age, of a sound constitution, and subject to no

disease except a casual fit of the gout, was suddenly attacked with a pain in the stomach, which was shortly succeeded by a total suspension of the action of the heart and of the lungs. By the power of the will, or rather by violent striving, he occasionally inflated the lungs, but over the heart he had no control whatever: nor, though he was attended by four of the chief physicians in London from the first, could the action of either be restored by medicine. In about three quarters of an hour, however, the vital actions began to return of their own accord, and in two hours he was perfectly recovered. "In this attack," observes Mr. (now Sir Everard) Home, who has given an interesting memoir of his life, "there was a suspension of the most material involuntary actions: even involuntary breathing was stopped: while sensation with its consequences, as thinking and acting, with the will, were perfect, and all the voluntary actions were as strong as before."

In the whole history of man I do not know of a more extraordinary case. The functions of the soul were perfect, while the most important functions of the body, those upon which the life depends absolutely, in all ordinary cases, were dead for nearly an hour. Why did not the soul separate from the body? and why did not the body itself commence that change, that subjection to the laws of chemical affinity, which it evinces in every ordinary case of the death or inaction of the vital organs? Because in the

present instance, as in every instance of suspended animation from hanging or drowning, the vital principle, whatever it consist in, had not ceased, or deserted the corporeal frame. It continued visible in its effect, though invisible in its essence and mode of operation.

Let us apply this remark to the subject immediately before us: it will serve as a ready clue to its intricacies. In many animals, then, and in most vegetables, the living principle often continues in the same manner to reside in, and to actuate the organic frame; while the vital functions, as they are called, and in conjunction with these, all the other functions of the system, remain inactive, not for an hour only, but for months and sometimes for years. It does so in the seeds of plants and the eggs of animals, so long as they are capable of germinating or pullulating. It does so in most animals, and perhaps in all vegetables, that sleep or become torpid during the winter-season; for though in a few hybernating animals, as the hedge-hog and Alpine marmot, we trace a small degree of corporeal action from their appearing thinner or returning to activity in the spring, the greater number, like dormice and squirrels, exhibit no diminution whatever. It does so, in a more extraordinary manner, in the ears of blighted corn; which, though incapable of filling and fattening, and seemingly lifeless and effete, still contain a seed that may be rendered productive of a sound and healthy increase. It does so in various

species of the moss; in various species of the snail, in one or two of the snake, in the wheel-polype, sloth, and tile-eel, and a variety of other animals and animalcules, that, like many of the preceding, have been kept apparently dead and in the form of dried preparations, totally destitute of irritability, altogether withered, and in substance as hard as a board for months and years, — in some instances as long as twenty years, — and have afterwards been restored to life and activity upon the application of warmth, moisture, or some other appropriate stimulus.*

These are extraordinary facts, and may be difficult to be comprehended: but they are facts nevertheless, and may be proved at any time and by any person. But there is a fact still more extraordinary, and of infinitely higher moment; and one in which we are all infinitely more interested — a fact to which these remarks naturally lead, and which they may serve in some degree to illustrate; it is the termination of the sleep of death, the resurrection of the body from the grave.

* Snails revived after being dried fifteen years and more. — Phil. Trans. 1774, p. 432.

See also Mr. Baner's Croonian Lecture "On the Suspension of the Muscular Powers of the Vibrio Tritici. — Phil. Trans. 1823. Art. 1. He has revived this curious worm after perfect torpitude and apparent death for five years and eight months, merely by soaking it in water.

LECTURE VIII.

ON VOICE AND LANGUAGE; VOCAL IMITATION; AND VENTRILOQUISM.

LANGUAGE, in the fullest scope of the term, is of two kinds; natural and articulate or artificial. The first belongs to most animals; the last is peculiar to man: it is his great and exclusive prerogative. This also is of two divisions; oral or vocal, which constitutes *speech;* and literal or legible, which constitutes *writing*. The first of these divisions shall form our subject for the present study; the second we will examine in a subsequent lecture.

At the root of the tongue lies a minute semi-lunar shaped bone, which from its resemblance to the Greek letter υ, or upsilon, is called the hyoid or u-like bone; and immediately from this bone arises a long cartilaginous tube, which extends to the lungs, and conveys the air backward and forward in the process of respiration.* This tube is denominated the trachea or windpipe; and the upper part of it, or that immediately connected with the hyoid-bone, the larynx:

* Stud. of Med. i. p. 457. edit. i.

and it is this upper part or larynx alone that constitutes the seat of the voice.

The tube of the larynx, short as it is, is formed of five distinct cartilages; the largest, and apparently, though not really, lowermost of which, produces that acute projection or knot in the anterior part of the neck, and especially in the neck of males, of which every one must be sensible. This is not a complete ring, but is open behind; the open space being filled up, in order to make a complete ring, with two other cartilages of a smaller size and power; and which together form the glottis, as it is called, or aperture out of the mouth into the larynx. The fourth cartilage lies immediately over this aperture, and closes it in the act of swallowing, so as to direct the food to the esophagus, another opening immediately behind it, which leads to the stomach. These four cartilages are supported by a fifth, which constitutes their basis; is narrow before, and broad behind, and has some resemblance to a seal-ring. The larynx is contracted and dilated in a variety of ways by the antagonist power of different muscles, and the elasticity of its cartilaginous coats; and is covered internally with a very sensible, vascular, and mucous membrane, which is a continuation of the membrane of the mouth.

The organ of the voice, then, is the larynx, its muscles, and other appendages; and the voice itself is the sound of the air propelled through and striking against the sides of its glottis, or

opening into the mouth. The shrillness or roughness of the voice depends on the internal diameter of the glottis, its elasticity, mobility, and lubricity, and the force with which the air is protruded. Speech is the modification of the voice into distinct articulations, in the cavity of the glottis itself, or in that of the mouth, or of the nostrils.

Those animals only that possess lungs, possess a larynx, and hence none but the three first classes in the Linnéan system, consisting of mammals, birds, and amphibials. Even among these, however, some genera or species are entirely dumb, as the myrmecophaga or ant-eater, the manis or pangolin, and the cetaceous tribes, together with the tortoise, lizards, and serpents; while others lose their voice in particular regions: as the dog is said to do in some parts of America *, and quails and frogs in various districts of Siberia.†

It is from the greater or less degree of perfection with which the larynx is formed in the different classes of animals that possess it, that the voice is rendered more or less perfect; and it is by an introduction of superadded membranes, or muscles, into its general structure, or a variation in the shape, position, or elasticity of those that are common to it, that quadrupeds and other animals are capable of making those peculiar sounds, by which their different kinds

* Pennant, Arctic Zool.

† Muller, Collect. of Russian Discoveries, vol. vii. p. 123.

are respectively characterised, and are able to neigh, bray, bark, or roar; to pur, as the cat and tiger kind, to bleat as the sheep, or to croak as the frog.

The larynx of the bird class is of a very peculiar form, and admirably adapted to that sweet and varied music with which we are so often delighted in the woodlands. In reality, the whole extent of the trachea or windpipe in birds may be regarded as one vocal apparatus; for the larynx is divided into two sections, or may rather, perhaps, be considered as two distinct organs; the more complicated, or that in which the parts are more numerous and elaborate, being placed at the bottom of the trachea, where it divides into two branches, one for each of the lungs; and the simpler, or that in which the parts are fewer, and consist of those not included in the former, occupying its usual situation at the upper end of the trachea, which, however, is without an epiglottis; the food and other substances being incapable of entering the aperture of the glottis from another contrivance. The lungs, trachea, and larynx of birds, therefore, may be regarded as forming a complete natural bagpipe; in which the lungs constitute the pouch and supply the wind; the trachea itself the pipe; the inferior glottis the reed, or mouth-piece, which produces the simple sound; and the superior glottis the finger-holes, which modify the simple sound into an infinite variety of distinct notes, and at the same time give them utterance.

Here, however, as among quadrupeds, we meet with a considerable diversity in the structure of the vocal apparatus, and especially in the length and diameter of the tube or trachea, not only in the different species, but often in the different sexes of the same species, more particularly among aquatic birds. Thus the trachea is straight in the tame or dumb swan (anas *Olor*) of both sexes; whilst in the male musical swan (anas *Cygnus*), it winds into a large convolution contained in the hollow of the sternum. In the spoon-bill (platalea *Leucorodia*), as also in the mot-mot pheasant (phasianus *Mot-mot*), and some others, similar windings of the trachea occur, not enclosed in the sternum. The males of the duck and merganser (Anas and Mergus), have at the inferior larynx, a bony addition to the cavity which contributes to strengthen their voice.

Many of the frog genus have a sac or bag in the throat, directly communicating with the larynx, as the tree frog (rana *arborea*), while the the green frog (rana *esculenta*) has two considerable pouches in the cheeks, which it inflates at the time of coupling, by two openings close to the glottis. And it is on this account they are able to give forth that kind of croaking music which they generally begin in the evening and continue through the greater part of the night. Two or three species, possessed of a similar kind of apparatus, are very clamorous animals; and,

pretending to a knowledge of the weather, are peculiarly noisy before rain or thunder-storms; while several, as the jocular and laughing toad (rana *risibunda* and r. *bombina*) are of a merrier mood, and seem to imitate with tolerable exactness the laugh of the human voice, in the hey-dey of their activity, which is always in the evening.

Among the bird tribes there are some possessed of powers of voice so singular, independently of that of their own natural music, that I cannot consent to pass them over in total silence. The note of the pipra *musica* or tuneful manakin, is not only intrinsically sweet, but forms a complete octave; one note succeeding another in ascending and measured intervals, through the whole range of its diapason. This bird is an inhabitant of St. Domingo, of a black tint, with a blue crown and yellow front and rump; about four inches long, very shy, and dexterous in eluding the vigilance of such as attempt to take it. The imitative power of several species of the corvus and psittacus kinds is well known; the jays and parrots are those most commonly taught, and the far-famed parrot of the late Colonel O'Kelly, which could repeat twenty of our most popular songs, and sing them to their proper tunes, has been, I suppose, seen and heard by most of us. The bulfinch (loxia *Pyrrhula*), however, has a better voice, as well as a more correct taste in copying musical tones, and the bird-breeders of Germany find a lucrative employment in training multitudes of this family for a foreign market.

The talents of the nightingale (motacilla *Lucina*) for speaking, are, likewise, said to be very extraordinary, and even equal to his talents for singing. But where is the man, whose bosom burns with a single spark of the love of nature, that could for one moment consent that this pride and delight of the groves should barter away the sweet wildness of its native wood-notes for any thing that can art offer in its stead?

There is no species, however, so much entitled to notice on account of its voice, as the polyglottus, or mocking-bird. This is an individual of the thrush kind; its own natural note is delightfully musical and solemn; but beyond this it possesses an instinctive talent of imitating the note of every other kind of singing bird, and even the voice of every bird of prey so exactly, as to deceive the very kinds it attempts to mock. It is moreover playful enough to find amusement in the deception; and takes a pleasure in decoying smaller birds near it by mimicking their notes, when it frightens them almost to death, or drives them away with all speed, by pouring upon them the screams of such birds of prey as they dread.

Now it is clear that the imitative, like the natural voice, has its seat in the cartilages and other moveable powers that form the larynx: for the great body of the trachea only gives measure to the sound, and renders it more or less copious in proportion to its volume. It is not, therefore, to be wondered at, that a similar sort of imitative

power should be sometimes cultivated with success in the human larynx; and that we should occasionally meet with persons, who, from long and dexterous practice, should be able to imitate the notes of almost all the singing-birds of the woods, or the sounds of other animals, or even to personate the different voices of orators and other public speakers.

One of the most extraordinary instances of this last kind consists in the art of what is called VENTRILOQUISM *, of which no very plausible explanation has hitherto been offered to the world. The practitioner of this occult art is well known to have a power of modifying his voice in such a manner as to imitate the voices of different persons conversing at a considerable distance from each other, and in very different tones. And hence the first impression which this ingenious trick or exhibition produced on the world, was that of the artist's possessing a double or triple larynx; the additional larynxes being supposed to be seated still deeper in the chest than the lowermost of the two that belong to birds: whence indeed the name of VENTRILOQUISM or BELLY-SPEAKING. Mr. Gough has attempted, in the Memoirs of the Manchester Society, to resolve the whole into the phænomena of echoes; the ventriloquist being conceived by him on all occasions to confine himself to a room well disposed for echoes in various parts of it, and merely to

* Stud. of Med. i. p. 463. edit. i.

produce false voices by directing his natural voice in a straight line towards such echoing parts, instead of in a straight line towards the audience; who, upon this view of the subject, are supposed to be artfully placed on one or both sides of the ventriloquist. It is sufficient to observe, in opposition to this conjecture, that it does not account for the perfect quiescence of the mouth and cheeks of the performer while employing his feigned voices; and that an adept in the art, like Mr. Fitzjames, or Mr. Alexander, is wholly indifferent to the room in which he practises, and will allow another person to choose a room for him. Mr. Fitzjames is a native of France; and his vocal art and vocal powers have been paid particular attention to by M. Richerand, one of the most popular French physiologists of the day; who has also examined the vocal organs of other ventriloquists, and observes, as the result of his investigations, that although there is little or no motion in the cheeks during the art of speaking, there is a considerable demand and expenditure of air; the ventriloquist always inhaling deeply before he commences his deception, passing a part of the air thus inhaled through his nostrils, and being able to continue his various voices as long as the inspired air may last, or till he has inhaled a fresh supply.

This view of the subject induced M. Richerand to relinquish the old hypothesis of a kind of vocal organ being seated in the stomach, to which we have already adverted, and which he had formerly

embraced; though it does not appear that he has very distinctly adopted any other in its stead: "At first," says he, "I had conjectured that a great part of the air expelled by expiration, did not pass out by the mouth and nostrils, but was swallowed and carried into the stomach; and, being reflected in some part of the digestive canal, gives rise to a real echo; but having afterwards more attentively observed this curious phænomenon in Mr. Fitzjames, who exhibits it in its greatest perfection, I was soon convinced that the name of *ventriloquism* is by no means applicable; since the whole of its mechanism consists in a slow gradual expiration; in which the artist either influences at his will the surrounding muscles of the chest, or keeps down the epiglottis by the base of the tongue, the point of which is not protruded beyond the arch of the teeth."*

M. De la Chapelle, without offering any particular explanation of this curious art, published, in 1772, an ingenious work, in which he attempted to prove that ventriloquism is of a very ancient date; and that it formed the mode by which the responses of many of the oracles of former times were delivered by the priests and priestesses to the credulous multitude around them. And although this able writer has not fully succeeded in establishing his point, it must be allowed by every one that no art, while it continued occult,

* Nouveaux Eléméns de Physiologie, in loc. Paris, 1804.

could better answer the purpose of such a sort of imposition; for an adept in the science is capable of modulating and inflecting his voice with so nice a dexterity, as not only to imitate, with equal accuracy, the cries of dogs, cats, infants, and persons in distress, together with every modification of articulate speech, but apparently to throw the mimic sound from whatever quarter he chooses: from the ceiling or roof of a house; the corner of a room; the mouths, stomachs, or pockets of any of the company present; from their hands or feet, from beneath a hat or a glass, or from a wooden doll. A humourous artist of this kind is said to have amused himself some years ago, by frequenting the fish-market at Edinburgh, and making a fish appear to speak, and give the lie to its vender in her own gross phrasing, upon her affirming that it was fresh, and caught in the morning; the fish quaintly replying as often as she so asserted, that it had been dead for a week, and that she knew it.

This singular art has given rise to a variety of extraordinary tales, and some of them of a very amusing kind. The following, which I copy from M. Bordeau, a learned critic of the sixteenth century, is of this description, and I will for once break through our accustomed gravity in order to give it you.

The gallant Francis I. of France, had an equally gallant and very shrewd valet de chambre, of the name of Lewis Brabant, who was also a most skilful ventriloquist. Lewis

Brabant had the misfortune to fall desperately in love with a young, very beautiful, and very wealthy heiress, whose father forbad his addresses in consequence of the disparity of his condition. The father, however, died soon after, and the courageous lover, unsubdued by a first repulse, was determined to try his fortune a second time, under favour of the new state of circumstances, and to see whether it would not be possible, upon a severe push, to call to his aid the art of ventriloquism, in which he was so considerable an adept.

He accordingly waited upon the mother as soon as decency would allow, and once more submitted his proposals. But faithful to the views of her deceased husband, the mother of the young lady made no scruple of once more giving Lewis Brabant a direct refusal. While, however, she was in the act of doing so, a low, hollow, sepulchral voice was heard by herself, and by every friend who was with her, and which was instantly recognised as the voice of the deceased, commanding her to give her daughter's hand immediately to Lewis Brabant, whom the piteous spirit affirmed he now knew to be a most worthy and excellent man, and considerably wealthier than he had taken him to be when alive ; adding, at the same time, that he was at that moment suffering a part of the pains of purgatory for having ill-treated, by his refusal, so exemplary a man ; and that he would not be released from them till his widow had consented.

All was mute astonishment; but Lewis Brabant appeared more astonished than the rest. He modestly observed, that whatever his merits or his virtues might be, he had no idea that they were worthy of being commemorated by a voice from the grave; but that nothing could give him more pleasure than to be made the happy instrument of extricating the old gentleman from the pains of purgatory, which it seemed he was suffering on his account. There was no doubt as to the voice; and consequently there was no doubt as to the path to be pursued: the mother, the daughter, the whole family, immediately assented with one accord, and Lewis Brabant had the honour to receive their commands to prepare for the nuptials with all speed.

To prepare for the nuptials, however, required the assistance of a little ready money; but Lewis Brabant was destitute of such an article. It was necessary, nevertheless, to procure it; and he now resolved to try whether the same talent which had obtained for him the promise of a wife, might not also obtain for him the material he stood in need of.

He recollected that there lived at Lyons an old miserly banker, of the name of Cornu, who had accumulated immense wealth by usury and extortion, and whose conscience appeared often to be ill at ease, in consequence of the means he had made use of; and it immediately struck him that M. Cornu was the very character that might answer his purpose.

To Lyons, therefore, he went instantly post-haste, commenced an immediate acquaintance with M. Cornu, and on every interview took especial care, on entering into conversation with him, to contrast the pure happiness enjoyed by the man whose conscience could look back, like M. Cornu's, as he was pleased to say, on a life devoted to acts of charity and benevolence, with the horrors of the wretch who had amassed heaps of wealth by usury and injustice, and whose tormented mind only gave him now a foretaste of what he was to expect hereafter. The miser was perpetually desirous of changing the conversation ; but the more he tried, the more his companion pressed upon him with it ; till finding, on one occasion, that he appeared more agitated than ever, the ventriloquist conceived such an occasion to be the golden moment for putting his scheme into execution ; and at that instant a low, solemn, sepulchral mutter was heard, as in the former case, which was at last found to be the voice of M. Cornu's father, who had been dead for some years, and which declared him to have passed all this time in the tortures of purgatory, from which he had now just learned that nothing could free him but his son's paying ten thousand crowns into the hands of Lewis Brabant, then with him, for the purpose of redeeming Christian slaves from the hands of the Turks.

All, as in the last case, was unutterable astonishment ; but Lewis Brabant was the most astonished of the two : modestly declared that

now for the first time in his life he was convinced of the possibility of the dead holding conversation with the living: and admitted that, in truth, he had for many years been benevolently employed in redeeming Christian slaves from the Turks, although his native bashfulness would not allow him to avow it publicly.

The mind of the old miser was distracted with a thousand contending passions. He was suspicious without having any satisfactory reason for suspicion; filial duty prompted him to rescue his father from his abode of misery: but ten thousand crowns was a large sum of money even for such a purpose. He at length resolved to adjourn the meeting till the next day, and to change it to another place. He required time to examine into this mysterious affair, and also wished, as he told his companion, to give his father an opportunity of trying whether he could not bargain for a smaller sum.

They accordingly separated; but renewed their meeting the next day with the punctuality of men of business. The place made choice of by M. Cornu for this rencontre, was an open common in the vicinity of Lyons, where there was neither a house, nor a wall, nor a tree, nor a bush, that could conceal a confederate, even if such a person should be in employment. No sooner, however, had they met than the old banker's ears were again assailed with the same hideous and sepulchral cries, upbraiding him for having suffered his father to remain for four and

twenty hours longer in all the torments of purgatory; denouncing that, unless the demand of the ten thousand crowns was instantly complied with, the sum would be doubled; and that the miser himself would be condemned to the same doleful regions, and to an increased degree of torture. M. Cornu moved a few paces forward, but he was assaulted with still louder shrieks: he advanced a second time, and now, instead of hearing his father's voice alone, he was assailed with the dreadful outcry of a hundred ghosts at once, those of his grandfather, his great grandfather, his uncles and aunts, and the whole family of the Cornus for the last two or three generations; who, it seems, were all equally suffering in purgatory — and were included in the general contract for the ten thousand crowns; all of them beseeching him in the name of every saint in the calendar to have mercy upon them, and to have mercy upon himself. It required more fortitude than M. Cornu possessed to resist the threats and outcries of a hundred and fifty or two hundred ghosts at a time. He instantly paid the ten thousand crowns into the hands of Lewis Brabant, and felt some pleasure that by postponing the payment for a day, he had at least been able to rescue the whole family of the Cornus for the same sum of money as was at first demanded for his father alone. The dextrous ventriloquist, having received the money, instantly returned to Paris, married his intended bride, and told the whole story to his sovereign and the

court, very much to the entertainment of all of them.

It is certain, that hitherto no satisfactory explanation has been offered of this singular phænomenon; and I shall, therefore, take leave to suggest, that it is, possibly, of a much simpler character than has usually been apprehended; that the entire range of its imitative power is confined to the larynx alone, and that the art itself consists in a close attention to the almost infinite variety of tones, articulations, and inflections the larynx is capable of producing in its own region, when long and dextrously practised upon, and a skilful modification of these effects into mimic speech, passed for the most part, and whenever necessary, through the cavity of the nostrils, instead of through the mouth. The parrot, in imitating human language, employs the larynx and nothing else; as does the mocking-bird, the most perfect ventriloquist in nature, in imitating cries and intonations of all kinds.

But the parrot and the mocking-bird, it may, perhaps, be said, open their mouths, and employ their tongues, which the ventriloquist, on many occasions, does not do; and that hence the organ of the tongue is equally necessary to inarticulate and to articulate language.

Such, I well know, is the general opinion; but it is an opinion opposed by a variety of uncontrovertible facts, and facts of a most im-

portant and singular nature, though they have seldom been attended to as they deserve.

Every bird-breeder knows that it is not necessary for birds to open their bills in the act of singing, except for the purpose of uttering the note already formed in the larynx, that would otherwise have to pass through the nostrils, which, in birds, prove a much less convenient passage for sound than in man; and of so little use is the tongue towards the formation of sound, that instances are not wanting of birds that have continued their song after they have lost the entire tongue by accident or disease. But without dwelling upon these points, which are of subordinate consideration, I pass on to observe, and to produce examples, that it is not absolutely necessary for man himself to be possessed of a tongue, or even of an uvula, for the purpose either of speaking or singing; or for that of deglutition or taste. In a course of physiological study, and in a lecture upon the nature and instruments of the voice, this is an enquiry, not only of grave moment, but immediately issuing from the subject before us.

Among almost innumerable instances of persons who have been able to articulate and converse without a tongue, too loosely recorded in ancient times to be fully depended upon, we occasionally meet with examples that are far better entitled to our credit. Such is the assertion of the emperor Justin *, who affirms, that he had

* Con. Tit. de Off. Præt.

seen venerable men "whose tongues having been cut out at the root, complained bitterly of the torture they had suffered;" and who tells us, in another place, of some others, upon whom Honorichius, king of the Vandals, had exercised the same barbarity; and who had, notwithstanding, "perfectly retained their speech." *

Upon the irruption of the Turks into Austria, in 1683, this cruelty was again put in practice upon many of those who unfortunately fell into their hands. Tulpius, whose veracity no man will lightly impeach, was at this time informed that one of the sufferers had escaped, and had recovered, and was still in possession of the use of speech, and residing at Wesop, in Holland; and, half doubtful of the truth of the common report, to Wesop he immediately set off, to satisfy himself by a personal examination. He saw the man, and found that he could not only speak, but could articulate those consonants and words which seem chiefly to depend upon the tip of the tongue for their pronunciation. This is a case the more worthy of attention, because the man had been so cruelly mutilated at the roof of the mouth, that he could not swallow the smallest quantity of food, without thrusting it into the esophagus with his forefinger. †

In the third volume of the Ephemerides

* Phil. Trans. 1742. p. 143; id. 1747. 621; in the Abridgment, viii, 586; ix. 375.

† Tulpii Observ. Medicæ, Amsterd.

Germanicæ, is another case of a similar kind, and most credibly authenticated. It relates to a boy that had lost his tongue at eight years of age by the small-pox, but was still able to speak. The boy was minutely examined in a full court before the members of the University of Saumur, in France, who had suspected some deception; the report, however, was found correct; and the University, in consequence, gave their official attestation to it, in order that posterity might have no room to doubt its validity.

To these let me add one more instance that occurred in our own country, in what may be almost called our own day, and which is very minutely detailed and authenticated in the Transactions of the Philosophical Society that were published between the years 1742 and 1747.* The case, as drawn up by Dr. Parsons, relates to a young woman of the name of Margaret Cutting, of Wickham Market, near Ipswich, in Suffolk, who, when only four years old, lost the whole of her tongue, together with the uvula, from what is said to have been a cancerous affection; but who still retained the power of speech, deglutition, and taste, without any imperfection whatever; articulating, indeed, as fluently, and with as much correctness as other persons; and, like the individual whose history is given by Tullius, articulating those peculiar syllables which ordinarily require the express aid

* In their abridged form, vol. viii. 586. and ix. 375.

of the tip of the tongue for exact enunciation. She also sang to admiration, and still articulated her words while singing, and could form no conception of the use of a tongue in other people. Neither were her teeth, in any respect, able to supply the place of the deficient organs; for there were but few in number, and rose scarcely higher than the surface of the gums, in consequence of the injury to their sockets from the disease that had destroyed the tongue. The case thus introduced before the Royal Society, was attested by the minister of the parish, a medical practitioner of repute, and another respectable person. From its singularity, however, the Society evinced a commendable tardiness of belief. They requested another report upon the subject, and from another set of witnesses, whom they themselves named for the purpose; and for whose guidance they drew up a line of categorical examination. This second report soon reached the Society, and minutely coincided with the first; and to set the question completely at rest, the young woman was shortly afterwards brought to London, and satisfied the Royal Society in her own person.*

It appears obvious, then, that the tongue, though a natural and common organ in the functions of voice, taste, and deglutition, is not absolutely necessary to these functions; that on

* Stud. of Med. i. 499, Edit. i., where other examples are noticed.

various occasions it has been, and, therefore, may be, totally lost, while the functions themselves continue perfect.

In singing, every one knows that the larynx is the only organ employed, except when the tones are not merely uttered but articulated: it is the only organ employed, as I have already observed, in the mock articulations of parrots and other imitative birds; it is the only organ of all natural tones, or natural language; and hence Lord Monboddo ingeniously conjectures, that it is the chief organ of articulate language in its rudest and most barbarous state. "As all natural cries," he observes, "even though modulated by music, are from *the throat and larynx, or part of the throat, with little or no operation of the organs of the mouth;* it is natural to suppose that the first languages were, for the greater part, *spoken from the throat;* and that what consonants were used to vary the cries, were mostly *guttural;* and that the organs of the mouth would at first be but very little employed." *

I have thus endeavoured to account for the chief difficulty, and the most extraordinary phænomenon that occurs in the art of VENTRILOQUISM,† that I mean of speaking without appear-

* Orig. and Progr. of Lang. vol. i. 6. iii. ch. 4.

† According to M. Magendie, whose work first appeared in our own country seven years after the delivery of the above Lecture, in 1811, the larynx is supposed to be the organ chiefly or altogether operated upon in France; and ventriloquism to consist in adjusting the measure of its

ing to speak, or discovering any motion of the lips: the larynx alone, by long and dextrous practice, and perhaps by a peculiar modification in some of its muscles, or cartilages, being capable of answering the purpose and supplying the place of the associate organs of the mouth.

It is this curious power, in the art of ventriloquism, that most astonishes us, and puts us off our guard; for the two other powers connected with it, of imitating various cries or voices, and of appearing to throw the voice from remote objects, are far more common and comprehensible. The power of vocal imitation where the tongue is allowed to be employed is possessed, by most persons, to a certain extent; and, by many, to a degree of accuracy, that would certainly deceive us in the dark; or if, by any other means, the performer were concealed from us. While the only point necessary to give the voice the semblance of issuing from a distant or unusual object, is to take a nice measure of the distance itself, and of the nature of the object from which it is to be presumed to issue, and so to modulate, or inflect it as to produce the natural tone it may be supposed to possess, if thrown from such a distance or from such a form. It must be obvious, however, that the

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articulations according to the effects which the ventriloquist has observed that distance, or other circumstances, produce upon the natural voice. See Edin. Med. and Surg. Journ. lxi. 577.

surprise resulting from the mystery of thus imitating voices and distances, must be powerfully aided in ventriloquism by the additional mystery of the artist's motionless mouth; in consequence of which we are totally incapable of referring it to himself. In hearing, as in seeing, habit is our only guide:—in both we only judge by accustomed comparisons; and we are exactly in the same manner deceived by the painter, and even allow ourselves to be deceived, in regard to objects of vision, as we are by the ventriloquist and without such allowance, in regard to objects of sound. In respect to both senses, indeed, we often deceive ourselves in judging of the most common phænomena: and hence it is not at all to be wondered at that we should be completely imposed upon by the nice delusions of art. Thus the evening sky, begirt with gold-green clouds at the extremity of the horizon, is often mistaken for the ocean, studded with islands; and the rumbling of a cart over pavement, or hard ground, is not unfrequently believed to be a thunder-clap in the heavens; and, under the influence of this last deception, we immediately transfer all the awefulness and magnificence of the celestial meteor to this clumsy piece of machinery, and are as alarmed as if the fiery bolt were about to descend upon us.

LECTURE IX.

ON NATURAL OR INARTICULATE, AND ARTIFICIAL OR ARTICULATE LANGUAGE.

HAVING, in our last lecture, examined into the seat and properties of the natural voice, let us now proceed to notice the mode in which it is applied to the formation, first, of natural language, and, next, of speech or artificial language.

Natural language is the instinctive appropriation of certain tones of the natural voice, to indicate certain feelings of the sensory: and with the few exceptions pointed out in our preceding lecture, every animal belonging to the three classes of mammals, birds, and amphibials, every animal possessed of lungs, is in some degree or other possessed of this kind of language. Its scope is, indeed, often very limited; but always sufficient to answer the purposes of nature. The female of every species understands the call of the male, and replies to it as intelligibly: the young understand the mandates of the mother, and the mother, the petitions of the young. This amusing department of natural history was well known to the philosophers of Greece and Rome, and attentively cultivated by them: and Lucretius, in his Nature of Things, has pursued

the subject not only so correctly but so copiously, that it is almost impossible, even in the present day, to add any thing of real importance to what he has already observed.

I have termed this language of nature instinctive: and that it is entitled to this character is clear; because, even among birds, which possess the widest and most complicated range of natural language of all animals whatever, where two individuals of different species are bred up in the same bush, or in the same cage, or hatched and fostered by a female of a third species, each evinces and retains the note that specifically distinguishes the species to which it belongs. In the case of a goldfinch and a chaffinch this has been put directly to the proof. And it is by this native tongue, as Mr. Montague has justly observed, and not by the form or colour, that the process of pairing is achieved, and the female induced to select her paramour.*

Almost every animal of the three classes just adverted to, exhibits a different tone of voice according to the governing passion of the moment; but more especially when under the influence of *grief*, *fear* or *joy*; to which, in some instances, we may add *anger*; but a distinct tone for anger is not so generally traced among animals as it is for the three preceding passions.

Among quadrupeds, the elephant, horse, and dog appear to possess the greatest portion of a

* Ornithological Dict. Introd. p. xxix.

natural tongue. They are all gregarious, particularly the two former. In Asia, the wild elephant, and in the Ukraine, between the Don and the Nieper, the wild horse, pursue one common plan of political society, in numerous and collected troops; and are regulated by the elders of the tribe among the elephants, and by leaders chosen for this purpose among the horses: and it is by a difference of voice, combined with a difference of gesture that these superiors give orders, in the course of their travels from place to place, in pursuit of pasture, for the necessary dispositions and arrangements. Both kinds are extremely vigilant and active, and maintain their ranks and brigades with as much regularity and precision as if they were conducted by a human leader. Among the wild horses of the Ukraine, the captain-general seems to be commonly appointed to his station for about four or five years; at the expiration of which time, a kind of new election takes place: every one appears to have a right to propose himself for the office, the ex-magistrate not excepted: if no new candidate offer, the latter is re-elected for the same term of time, and if he be opposed a combat succeeds, and the victor is appointed commander-in-chief.

The conduct pursued by the peaceful and amiable elephant varies in some degree from this of the wild horse; for, in the travels of these animals from place to place, the troops are led

on by the eldest of the tribe, thus evincing a kind of patriarchial government: the young and feeble marching in the middle, and the rear being composed of the vigorous and adult.*

The natural language of the monkey kind, notwithstanding the general resemblance of their structure to that of the human race, appears to be more confined than that of most quadrupeds; and it is well known, that they never attempt to articulate sounds. Linnéus, indeed, seems to have entertained a contrary opinion with respect to the orang-otang, and asserts that he speaks with a kind of hissing noise. Buffon, however, and Daubenton, and almost every other naturalist who has attentively watched his habits, deny that he ever employs even a hissing speech. And every comparative anatomist, who has accurately examined his vocal organs, has declared him to be physically incapable of articulation, from the peculiarity of a sac or bag, in some species of the animal single, in others double, immediately connected with the upper part of the larynx, and into which the air is driven as it ascends from the lungs through the trachea, instead of being driven into the glottis, where alone it could acquire modulation and articulate sounds. From this sac or bag it afterwards passes into the mouth by a variety of

* See note to the Author's Translation of Lucretius, vol. ii. p. 376.

small apertures or fissures, by which almost the whole of its force, and consequently of its vocal effect is lost. This peculiar conformation appears first to have been noticed by Galen, who traced it through several varieties both of the ape and monkey families; but for the most correct account of it we are indebted to professor Camper, who, in a paper published in the Philosophical Transactions for 1779, minutely describes it as it exists in the sylvanus or pigmy, in which Tyson had overlooked it; in various other species of the ape; in the cynosurus or dog-tailed monkey; and in many others of the monkey tribe. At all adventures, the monkey has a peculiar deficiency of natural tongue; and we hence obtain an insuperable objection, had we no others, but which I have already shown, are sufficiently abundant *, to the declaration of Lord Monboddo and Linnéus that this tribe are all of the same original stock as man; and their absurd story that man himself is not unfrequently to be met with in some of the Asiatic islands, with a monkey-tail, varying in length from three or four inches to a foot, possessing as great a fluency of speech as in any part of Europe.

Marcgrave, in his history of Brazil, has amused us with an account of a very extraordinary species of American sapajou, which Linnéus has

* Vol. II. Ser. II. Lect. III. On the Varieties of the Human Race.

called Beelzebub, Buffon, Ouarine, and our own countryman, Mr. Pennant, Preacher-monkey, that assemble in large groups every morning and evening, and attentively listen to a loud and long-continued harangue of one of the tribe, whom he seems to suppose a public officer or popular demagogue. Upon the authority of Marcgrave, this species has been admitted into all our books of Natural History; but there are some doubts concerning it, and the description is at least without the support of concurrent testimony.

The different accents of the dog and the horse, when under the influence of rage, desire, or exultation, are too powerful and too common not to have been noticed by almost every one. It is impossible to describe the different tones of the mastiff more precisely than in the words of the truly philosophical poet I have so lately referred to; but as it would be improper to quote him in the original before a popular audience, I must request of you to receive a feeble translation of him in its stead:

> When half enraged,
> The rude Molossian mastiff, her keen teeth
> Baring tremendous, with far different tone
> Threats, than when rous'd to madness more extreme,
> Or when she barks, and fills the world with roar.
> Thus, when her fearless whelps, too, she with tongue
> Lambent, caresses, and, with antic paw,
> And tooth restrain'd, pretending still to bite,
> Gambols, soft yelping tones of tender love —

Far different, then, those accents from the din
Urg'd clamorous through the mansion when alone,
Or the shrill howl her trembling bosom heaves,
When, with slunk form, she waits th' impending blow.*

The language of the tyger, leopard, and cat, is not so rich or diversified as that of the dog; but they have still a considerable variation in the scale of their mewings, according to the predominant passion of fear or grief: while these again differ from the accent of simple pleasure, which consists in purring, and very considerably indeed from the loud and dissonant voice of love.

The language of birds is, in almost every instance, strikingly musical, though not equally eloquent, whatever be the passion it describes. To its variety in the different tribes of the osprey, hawk, sea-gull, rook, and raven, and especially as auguring, wet or dry, stormy or

* Inritata canum quom primum magna Molossûm
Mollia ricta fremunt, duros nudantia denteis,
Longe alio sonitu rabies districta minatur,
Et quom jam latrant, et vocibus omnia conplent.
At catulos blande quom linguâ lambere tentant,
Aut ubi eos lactant pedibus, morsuque potentes,
Subspensis teneros imitantur dentibus haustus,
Longe alio pacto gannitu vocis adulant,
Et quom desertei baubantur in ædibus, aut quom
Plorantes fugiunt, submisso corpore, plagas.
De Rer. Nat. v. 1063.

serene weather, almost every naturalist has borne testimony: for each can say that

> Cawing rooks and kites that swim sublime
> In still repeated circles, screaming loud,
> The jay, the pie, and e'en the boding owl
> That hails the rising moon, have charms for me.
> Sounds inharmonious in themselves, and harsh,
> Yet heard in scenes where peace for ever reigns,
> And only there, please highly for their sake.*

Upon the exquisitely varied tones and modulations of the singing-birds we descanted at some length in a former lecture.† But the subject is as interesting as it is inexhaustible; and in the summer-season of praise, when the heart of man overflows, or should overflow, with gratitude to his beneficent Creator for the return of plenteousness that meets his eye in every direction, with what animation do they join in the general carol; awakening us at the dawn, accompanying us through the day, and softening and harmonizing, and I fear not to add, spiritualizing our feelings at night-fall.

The robin, and not the lark, as commonly supposed, takes the lead‡, and seems longing for the day to unclose. His gentle voice is in sweet accordance with the feeble beams of the early twilight; and as soon as the glorious sun makes his appearance, then up mounts the lark, and

* Task, book i.

† Vol. II. Ser. II. Lect. 1. on Zoological Systems; and the distinctive characters of Animals.

‡ See Jenner, Phil. Trans. 1824, p. 37.

pours forth his more vigorous song; a thousand warblers hear the call, and the chorus is full and complete. The leaders vary, but the carol continues. The nightingale yet protracts his nocturnal tones; and the thrush, the blackbird, and the goldfinch, from the lofty grove, the close thicket, or the blossomed orchard, intermingle their rival pretensions: while the transient but mellow burst of the cuckoo, adds a richness to the general harmony; and even the croak of the raven, and the chattering of the daw, only break into the symphony, with an occasional discord that heightens the impressive effect. At length the sun is no more: the unbounded concert dies away; and the season of rest returns. It returns, but not with mute silence; for the night is soothed rather than disturbed by the solitary song of the robin, now resuming his modest strain, and yielding in succession to the peerless pipe of the nightingale, and the deep-toned but expressive hoot of the owl.

The note of the wren (motacilla *Troglodytes*) is as slender as its form, but it is well worth noticing as being the only note of the feathered creation that is continued throughout the winter. During the season of frost and snow it is, indeed, heard to most advantage; for the fearless little songster then enters the court-yard, the stable, or the dairy, and seeks, in confidence, his food of insects or their larves. It is this that constitutes the little beggar's petition; and where is the heart so hardened as to refuse the request he then offers?

With respect to singing-birds, indeed, of all kinds, we may make this pleasing observation, that, as though chiefly intended, in the general munificence of the great Parent of the human race, to captivate mankind, they almost always reside in their vicinity, and are rarely to be found in the uninhabited parts of the earth. *

* The following passage from Dr. Jenner's very admirable paper "On the Migration of Birds," has a passage so directly in accordance with these remarks, that I cannot avoid copying it from the Phil. Trans. for 1824.

"We must observe, that nature never gives one property *only*, to the same individual substance. Through every gradation, from the clod we tread upon to the glorious sun which animates the whole terrestrial system, we may find a vast variety of purposes for which the same body was created. If we look on the simplest vegetable, or the reptile it supports, how various, yet how important in the economy of nature, are the offices they are intended to perform! The migrating bird, I have said, is directed to this island at a certain season of the year to produce and rear its young. This appears to be the grand intention which nature has in view; but in consequence of the observation just made, its presence here may answer many secondary purposes; among these I shall notice the following. The beneficent Author of nature seems to spare no pains in cheering the heart of man with every thing that is delightful in the summer season. We may be indulged with the company of these visitors, perhaps, to heighten, by the novelty of their appearance, and pleasing variety of their notes, the native scenes. How sweetly, at the return of spring, do the notes of the cuckoo first burst upon the ear; and what apathy must that soul possess, that does not feel a soft emotion at the song of the nightingale, (surely it must be "fit for treasons, stratagems, and spoils") and how wisely is it contrived that a general stillness should prevail while this heavenly bird is pouring forth its plaintive

But the vocabulary of the common cock and hen, is, perhaps, the most extensive of any tribe of birds with which we are acquainted; or rather, perhaps, we are better acquainted with the extent of its range than with that of any others. The cock has his watch-word for announcing the morning, his love-speech, and his terms of defiance. The voice of the hen, when she informs her paramour that she is disburdened

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and melodious strains, — strains that so sweetly accord with the evening hour! — Some of our foreign visitors, it may be said, are inharmonious minstrels, and rather disturb than aid the general concert. In the midst of a soft warm summer's day, when the martin is gently floating on the air, not only pleasing us with the peculiar delicacy of its note, but with the elegance of its meandering; when the blackcap is vying with the goldfinch, and the linnet with the woodlark, a dozen swifts rush from some neighbouring battlement, and set up a most discordant screaming. Yet all is perfect. The interruption is of short duration, and without it, the long continued warbling of the softer singing birds would pall and tire the listening ear with excess of melody, as the exhilarating beams of the sun, were they not at intervals intercepted by clouds, would rob the heart of the gaiety they for a while inspire, and sink it into languor. There is a perfect consistency in the order in which nature seems to have directed the singing birds to fill up the day with their pleasing harmony. To an observer of those divine laws which harmonize the general order of things, there appears a design in the arrangement of this sylvan minstrelsy. It is not in the haunted meadow, nor frequented field, we are to expect the gratification of indulging ourselves in this pleasing speculation to its full extent; we must seek for it in the park, the forest, or some sequestered dell, half enclosed by the coppice or the wood."

of an egg, and which he instantly communicates from homestead to homestead, till the whole village is in an uproar, is far different from that which acquaints him that the brood is just hatched; and both again are equally different from the loud and rapid cries with which she undauntedly assails the felon fox that would rob her of her young. Even the little chick, when not more than four or five days old, exhibits a harsher and less melodious clacking when offered for food what it dislikes, than when it perceives what it relishes.*

Before I quit this part of our subject it becomes me also to remark that, even in various other tribes of animals than the three classes to which our observations have hitherto applied, we occasionally meet with proofs of an inferior kind of natural language, though it cannot with propriety be called a language of the voice. And I may here observe, that among the few of these three classes, which we have already noticed as being destitute of a vocal larynx, the bounty of nature has often provided a substitute. Thus the wapiti (cervus *Wapiti* of Barton), though without the sonorous endowment of the horse or ox, seems to have a compensation in an organ that consists of an oblique slit or opening under the inner angle of each eye, nearly an inch long externally, which appears also to be an auxiliary to the nostril; for with this he makes a noise

* See White's Hist. of Selborne, vol. ii. p. 17.

that he can vary at pleasure, and which is not unlike the loud and piercing whistle, that boys give by putting their fingers in their mouth. *

Among insects, however, we find a still more varied talent of uttering sounds, though possest neither of lungs nor larynx, nor the nasal slit of the wapiti. The bee, the fly, the gnat, and the beetle, afford familiar instances of this extraordinary faculty. The sphinx *Atropos*, a species of hawk-moth, squeaks, when hurt, nearly as loud as a mouse; it has even the power, in certain circumstances, of uttering a plaintive note, which cannot fail to excite deep commiseration. If a bee or wasp be attacked near its own hive, the animal expresses its pain or indignation in a tone so different from its usual hum, that the complaint is immediately understood by the hive within; when the inhabitants hurry out to revenge the insult in such numbers, that the offender is fortunate if he escape without a severe castigation.

The cunning spider often avails himself of the natural tone of distress uttered by the fly to make sure of him for his prey. He frequently spreads out his webs or toils to such an extent that he cannot see from one end of them to the other; and often conceals himself in some adjoining crevice where he cannot see the poor animal as it becomes ensnared: but he sits wistfully listening for the buzzing noise that

* See Phil. Mag. No. 223, Nov. 1816, p. 392.

assures him the fly is entangled, and is fluttering to make its escape. He hears the well-known signal, sallies forth from his concealment, and riots on the spoil that has fallen into his power with all the eagerness and ferocity that distinguish the most rapacious quadrupeds.

Whether fishes possess any similar means of communicating their feelings we know not. Reasoning from the facts that a few of them occasionally utter tones of distress when first taken; and that they possess an organ of hearing, and live in a medium well adapted to the propagation of sound, it is generally conjectured that they have a language of some kind or other: but our knowledge of their usual habits, from their residing in a different element from our own, is so imperfect, that we have no positive data to build upon.

It is a curious fact, that many animals which are naturally dumb in the widest sense of the word, are possest of a power of producing sounds by the use of some external organ or foreign instrument, that forms a very convenient substitute for a natural tongue. I have formerly had occasion to observe this of the goat-chaffer or cerambyx, which, whenever taken, utters a shrill shriek of fright, by rubbing its chest against its wing-shells, and the upper part of its abdomen; and of the ptinus *fatidicus*, or death-watch, that produces its measured, and to the superstitious, alarming strokes, by striking its horny frontlet against the bed-post, or any other hard substance

in which it takes its stand. The termes *Pulsatorium*, or tick-watch, is an insect of a different order; but armed with a similar apparatus, and makes a noise by the same means, like the ticking of a watch, from the old wood or decayed furniture in which it loves to reside, and by which it endeavours to entice the other sex to its company. And it is a singular circumstance, which I shall merely glance at in passing, that some species of the wood-pecker, in the breeding season, in consequence of the feebleness of its natural voice, makes use of a similar kind of call, by strong reiterated strokes of the bill against a dead sonorous branch of a tree.

The most astonishing instance, however, of sound excited in this manner, is that made by two species of Italian grasshoppers: the cicada *Plebeja*, and c. *orni*. The music of these insects (which is confined to the male) is produced by a very singular apparatus, that consists of several winding cells under the abdomen, separated by different membranes, and opening externally by two narrow valves. In the centre of these cells is contained a scaly sonorous triangle, and exterior to them are two vigorous muscles, by the action of which the cells are supplied with air through one of the valves, and so powerfully reverberate it against the triangle as to produce the notes of which the grasshopper's song consists; and which is sometimes so loud that a single insect hung in a cage has

almost drowned the voices of a large company. This song is also the madrigal of love.

But highly tempting as it is, I must not pursue this part of our subject any farther. From the birds of the field to the grasshopper, from the bee to the fly, every attentive naturalist observes, in every tribe, a vast compass of accentuation, and comprehends the meaning of a great variety of their tones. But what is the little that we understand to what is understood by themselves, formed with similar organs, in a thousand instances more acute than our own, actuated by similar wants, and proposing to themselves similar pursuits!

What the natural language of man is we know not. There can be no doubt, however, that if, by a miracle, he were to be deprived of all artificial language, there would still remain to him, from the perfection of his vocal organs, a language of this kind, and of far greater extent and variety than that of any other animal.

But some schools of philosophers have not been satisfied with contemplating such an idea hypothetically; they have boldly embodied it into a fact, and have contended, and still continue to contend, that such a language has actually existed; and that it constituted the sole language of man on his first formation: the only means he possessed of communicating and interchanging his ideas.

But whence then has artificial language arisen? That rich variety of tongues which distinguishes

the different nations on the earth; and that wonderful facility which is common to many of them of characterizing every distinct idea by a distinct term?

And here such philosophers are divided: some contending that speech is a science that was determined upon and inculcated in an early period of the world, by one, or at least by a few superior persons acting in concert, and inducing the multitude around them to adopt their articulate and arbitrary sounds: while others affirm that it has grown progressively out of the natural language, as the increasing knowledge and increasing wants of mankind have demanded a more extensive vocabulary. *

Pythagoras first started the former of these two hypotheses, and it was afterwards adopted by Plato, and supported by all the rich treasure of his genius and learning; but it was ably opposed by the Epicureans, on the ground that it must have been equally impossible for any one person, or even for a synod of persons, to have invented the most difficult and abstruse of all human sciences, with the paucity of ideas, and the means of communicating ideas, which, under such circumstances, they must have possessed: and that even allowing they could have invented such a science, it must still have been utterly impossible for them to have taught it to

* See on this subject Harris's Hermes, book iii. p. 314. 327. and Beattie on the Theory of Language, p. 246. Lond. 1803. 4to.

the barbarians around them. The argument is thus forcibly urged by Lucretius, whom I must again beg leave to present in an English dress:

But to maintain that one devis'd alone
Terms for all nature, and th' incipient tongue
Taught to the gazers round him, is to rave.
For how should he this latent power possess
Of naming all things, and inventing speech,
If never mortal felt the same besides?
And, if none else had e'er adopted sounds,
Whence sprang the knowledge of their use? or how
Could the first linguist to the crowds around
Teach what he mean'd? his sole unaided arm
Could ne'er o'erpower them, and compel to learn
The vocal science; nor could aught avail
Of eloquence or wisdom; nor with ease
Would the vain babbler have been long allow'd
To pour his noisy jargon o'er their ears. *

In opposition to this theory, therefore, Epicurus and his disciples contended, as I have just observed, that speech or articulate language is

* Proinde, putare aliquem tum nomina distribuisse
Rebus, et inde homines didicisse vocabula prima,
Desipere est: nam quur hic posset cuncta notare
Vocibus, et varios sonitus emittere linguæ,
Tempore eodem aliei facere id non quisse putentur?
Præterea, si non aliei quoque vocibus usei
Inter se fuerant, unde insita notities est?
Utilitas etiam, unde data est huic prima potestas,
Quid vellet facere, ut sciret, animoque videret?
Cogere item plureis unus, victosque domare,
Non poterat, rerum ut perdiscere nomina vellent:
Nec ratione docere ullâ, suadereque surdis,
Quod sit opus facto; faciles neque enim paterentur:
Nec ratione ullâ sibi ferrent amplius aureis
Vocis inauditos sonitus obtundere frustra.

De Rer. Nat. v. 1040.

nothing more than a natural improvement upon the natural language of man, produced by its general use, and that general experience which gives improvement to every thing. And such still continues to be the popular theory of all those philosophers of the present day, who confine themselves to the mere facts and phænomena of nature, and allow no other authority to control the chain of their argument. Such, more especially, is the theory of Buffon, Linnéus, and Lord Monboddo; who, overstepping the limits of the Epicurean field of reasoning, and the articles of the Epicurean belief, concur, as I have already remarked, in deriving the race of man from the race of monkeys, and in exhibiting the orang-otang, as his dignified prototype and original, whom they have hence denominated the satyr or man of the woods.

I shall not exhaust the time or insult the understanding of this auditory by any detailed confutation of the new and adscititious matter contained in this modernized edition of the Epicurean theory; matter of which the Grecian sage himself would have been ashamed: and which is directly contradicted by the anatomical configuration of various and important parts of this animal itself; concerning which, it is scarcely necessary to recal to your recollection the remark we have just made — that whilst it approaches nearest to the form, it is farthest removed from the language of man of almost all quadrupeds whatever. I shall confine myself to the fair question, which

the theory in its original shape involves; — is human speech, thus proved to be incapable of origin by any compact or settled system, more likely to have originated from a succession of accidents — from the casual but growing wants, or the casual but growing improvements of mankind?

Now admitting the affirmative of this question, we have a right to expect that the language of a people will always be found commensurate with their civilization: that it will hold an exact and equal pace with their degree of ignorance, as well as with their degree of improvement. It so happens, however, that although language, whatever be its origin, is the most difficult art or science in the world, (if an art or science at all) it is the art or science in which savages of all kinds exhibit more proficiency than in any other. No circumnavigator has ever found them deficient in this respect, even where they have been woefully deficient in every thing else; and while they have betrayed the grossest ignorance in regard to the simplest toys, baubles, and implements of European manufacture, there has been no difficulty, as soon as their language has been, I will not say acquired, but even dipped into, of explaining to them the different uses and intentions of these articles in their own terms.

Again: there is in all the languages of the earth a general unity of principle, which evidently bespeaks a general unity of origin; a family character and likeness which cannot pos-

sibly be the effect of accident. The common divisions and rules of one language are the common divisions and rules of the whole; and, hence, every national grammar is, in a certain sense, and to a certain extent, an universal grammar; and the man who has learnt one foreign tongue, has imperceptibly made some progress towards a knowledge of other tongues. In all countries, and in all languages, there is only one and the same set of articulations, or at least the differences are so few, that they can scarcely interfere with the generality of the assertion: for diversities of language consist not in different sets of articulations, but only in a difference of their combinations and applications. No people have ever been found so barbarous as to be without articulate sounds, and no people so refined and fastidious as to have a desire of adding to the common stock.

But, independently of an uniform circle of articulations, and an uniform system of grammar, there is also an uniform use of the very same terms, in a great variety of languages, to express the very same ideas; which, as it appears to me, cannot possibly be accounted for, except upon the principle of one common origin and mother tongue; and I now allude more particularly to those kinds of terms, which, under every change of time, and every variety of climate, or of moral or political fortune, might be most readily expected to maintain an immutability; as those for example of family relationship and patriarchal

respect; or descriptive of such other ideas as cannot but have occurred to the mind very generally, as those of earth, sky, death, deity. I shall beg leave to detain you while I offer a few examples.

In our own language we have two common etymons, or generic terms, by which to describe the paternal character, *papa* and *father;* both are as common to the Greek tongue as to our own, under the forms of παππας and πατηρ, and have probably alike issued from the Hebrew source אב or אבא pl. אבת. And I may fearlessly venture to affirm that there is scarcely a language or dialect in the world, polished or barbarous, continental or insular, employed by blacks or whites, in which the same idea is not expressed by the radical of the one or the other of these terms; both of which have been employed from the beginning of time in the same quarter of the globe, and naturally direct us to one common spot where man must first have existed, and whence alone he could have branched out. The term *father* is still to be found in the Sanscrit, and has descended to ourselves, as well as to almost every other nation in Europe, through the medium of the Greek, Gothic and Latin. Papa is still more obviously a genuine Hebrew term; and while it maintains a range almost as extensive as the former throughout Europe, it has an incalculably wider spread over Asia, Africa, and the most barbarous islands of the Pacific, and extends from

Egypt to Guinea, and from Bengal to Sumatra and New Zealand. The etymons for *son* are somewhat more numerous than those for *father*, but the one or the other of them may be traced almost as extensively, as may the words *brother*, *sister*, and even *daughter;* which last, branching out like the term *father*, from the Sanscrit, extends northward as far as Scandinavia.

The generic terms for the Deity are chiefly the three following, *Al* or *Allah*, *Theus* or *Deus*, and *God*. The first is Hebrew, the second Sanscrit, the third Persian, and was probably Palavi or ancient Persian. And besides these, there is scarcely a term of any kind by which the Deity is designated in any part of the world, whether among civilized or savage man. And yet these also proceed from the same common quarter of the globe, and distinctly point out to us the same original cradle for the human race as the preceding terms. Among the barbarians of the Philippine Islands the word is *Allatallah*, obviously "the God of Gods," or Supreme God; and it is the very same term, with the very same duplicate, in Sumatra. In the former islands, I will just observe also, as we proceed, that we meet with the terms, *malahet*, for a *spirit*, which is both direct Hebrew and Arabic; *is* and *dua*, *one*, *two*, which are Sanscrit and Greek; *tambor*, a *drum*, which is also Sanscrit; and *inferno*, *hell*, a Latin compound, of Pelasgic or other oriental origin. In the Friendly and other clusters of the Polynesian Islands, the term for God is *Tooa*,

and in New Guinea, or Papuan, *Dewa*, both obviously from the Sanscrit; whence *Eatooaa*, among the former, is God the Spirit, or the Divine Spirit: *Ea*, meaning a spirit in these islands. And having thus appropriated the Sanscrit radical to signify the Deity, they apply the Hebrew *El*, as the Pelasgians and the Greeks did, to denote the *sun*, or the most glorious image of the Deity; whence *el-langee* means the *sky*, or sun's residence, and *papa ellangee*, or *papa langee*, fathers of the sky, or "*spirits.*"

Allow me to offer you another instance or two. The more common etymon for *death*, among all nations, is *mor*, *mort*, or *mut*; sometimes the *r*, and sometimes the *t*, being dropped in the carelessness of speech. It is *mut* in Hebrew and Phœnician; it is *mor*, or *mort*, in Sanscrit, Persian, Greek, and Latin; it is the same in almost all the languages of Europe; and it was with no small astonishment the learned lately found out that it is the same also in Otaheite, and some other of the Polynesian islands, in which *mor-ai* is well known to signify a *sepulchre*; literally, the place or region of the dead; *ai* meaning a place or region in Otaheitan, precisely as it does in Greek. An elegant and expressive compound, and which is perhaps only to be equalled by the Hebrew *zalmut* (צל מות), literally, *death-shade*, but which is uniformly rendered, in the established copy of our Bibles, *shadow of death.*

Sir, in our own language, is the common title

of respect; and the same term is employed in the same sense throughout every quarter of the globe. In Hebrew its radical import is "a ruler or governor;" *sir*, *s-her*, or *sher*, according as the *h* is suppressed, or slightly, or strongly aspirated; in Sanscrit and Persian it means the organ of the head itself; in Greek it is used in a sense somewhat more dignified, and is synonymous with *lord;* in Arabia, Turkey, and among the Peruvians in South America, it is employed as in the Greek; and not essentially different in Spain, Portugal, Italy, and France; the last country never using it, however, but with a personal pronoun prefixed; and it is the very same term in Germany, Holland, and the contiguous countries; the *s* being dropped in consequence of the *h* being aspirated more harshly; whence the Hebrew *s-her* is converted into *her*, used also commonly, as the similar term is in France, with the prefix of a *personal pronoun.*

The radical idea of the word MAN is that of a *thinking* or *reasonable being*, in contradistinction to the whole range of the irrational creation, by which the thinking being is surrounded. And here again I may boldly assert, that while in the primary sense of the word we have the most positive proof of the quarter of the globe from which it issued, and where mankind must first have existed, and from which he must have branched out into every other quarter, there is not a language to be met with, ancient or modern, insular or continental, civilized or

savage, in use among blacks or whites, in which the same term, under some modification or other, is not to be traced, and in which it does not present the same general idea.

MAN, in Hebrew, to which the term is possibly indebted for its earliest origin, occurs under the form מנה (*maneh*), a verb directly importing "to discern or discriminate;" and which, hence, signifies as a noun, "a discerning or discriminating being." In Sanscrit we have both these senses in the directest manner possible; for in this very ancient tongue, *man* is the verb, and can only be rendered "to think or reason;" while the substantive is *mana*, of precisely the same meaning as our own word *man;* and necessarily importing, as I have already observed, "a thinking or reasonable creature." Hence *Menu*, in both Sanscrit and ancient Egyptian, is synonymous with Adam, or the FIRST MAN, emphatically *the man;* hence, again, MENES was the first king of Egypt; and MINOS, the first or chief judge, discerner, or arbitrator among the Greeks. Hence, also, in Greek, *men* and *menos* (μεν and μενος) signify *mind*, or, "the thinking faculty;" but μενος, contracted, is *mens*, which, in the Latin language, imports the very same thing. In the Gothic, and all the northern dialects of Europe, *man* imports the very same idea as in our own tongue; the English, indeed, having descended from the same quarter. In Bengalee and Hindoostanee, it is *manshu;* in Malayan, *manizu;* in Japanese, *manio;* in

Atooi, and the Sandwich islands generally, *tane*, *tanato*, or *tangi*; while *manawe* imports the *mind* or *spirit*; and in New Guinea, or Papuan, it is *sonaman*, a compound evidently produced from *man*. In this utmost extremity, this *Ultima Thule* of the southern world, I will just observe also, in passing, that we meet with the terms *Sytan* for *Satan*, or the Source of Evil; and *Wāth* (Germ. *Goth*), for *God*.

But it may, perhaps, be observed, that in all the southern dialects of Europe, the French, Italian, Spanish, and Portuguese, we meet with no such term as *man*; nor in the Latin, from which all these are derived, in which last language the term for *man* is *homo*. Yet nothing is easier than to prove, that even *homo* itself, the source of all these secondary terms, is derived from the same common root. This is clear from its adjective, which is *hu-man-us*: while every school-boy knows that *man*, or *men*, though not in the classical nominative case of the substantive, is included in every inflection below the nominative case: as ho-*min*-is, ho-*min*-i, ho-*min*-em, ho-*min*-e; and it was formerly included in the nominative itself, which was ho-*men*; whence, nothing is clearer than that the particle *ho* is redundant, and did not originally belong to the word. And were any additional argument necessary, I might advert to the well-known fact, that this redundant particle is absolutely omitted in the negation of *homo*, which is not *ne-homo*, but *nemo*, and was at first *ne-men*;

and which, like *homo*, or *homen*, runs, as every one knows, ne-*min*-is, ne-*min*-i, &c. It is easy, however, to prove this redundancy of the *ho*, by showing the quarter from which it was derived. The old Latin term was *ho-men*, *ho-min-is*; which every one must perceive is literally the obsolete Greek μεν, with the article ὁ added to it; ὁ μεν or *ho-men*, emphatically *the man*. The *ho* is also omitted in the feminine of *homo*, which is *fe-min-a*, and was at first *feo-min-a*, from *feo*, to produce; literally, the producer, or bringer forth of man, or *min*. Nothing, as it appears to me, is clearer than this, though the etymologists have hitherto sought in vain for the origin of *femina*. From *feomina*, or, without the termination, *feomin*, we have derived our own and the common Saxon term, *woman*; the *f*, and *v* or *w*, being cognate, or convertible letters in all languages; of which we have a familiar instance in the words *vater*, and *father*, which, in German and English, mean precisely the same thing.

But this subject would require a large volume instead of occupying the close of a single lecture. It is, however, as you will find, when we come to apply it, of great importance; and I must yet, therefore, trouble you with another example or two.

Youth and *young* are as capable of as extensive a research, and are as common to all languages, barbarous and civilized, as the word *man*. I will only at present remark that we

meet with it in Hebrew, where it is יונה (*yuna*); in Persia and Palavi, or ancient Persian, where it is *juani*; in Sanscrit, where it is *yauvan*; in Greek, υιον (*yion*), from υιος or υιωνος; in Latin, where we find it *juvenis*; in Gothic and German, where it is *jung*; in Spanish, *joven*; in Italian, *giovan*; in French, *jeune*; and, as I have already observed, in our own dialect, *young*.

The word *regent*, in like manner is, and ever has been, in equal use among all nations. This, like the French *regir*, is derived from the Latin *rege*; which runs through all the southern dialects of Europe; while in Germany, and the north, the derivative *recht* is the common term for *rule*, *law*, *authority*. The Hebrew is ראי (*raj*), a conspicuous or illustrious person; the Sanscrit, *raja*; the Greek, ρα and ραων; of the same exact import as the Hebrew; and hence *ra*, or *raia*, imports *the sun*, the most powerful and illustrious object in creation, among a multitude of barbarous nations, and especially those of the Sandwich Islands and New Zealand; and *ooraye* and *rayan-ai*, the *day* or *light* itself, in different parts of Sumatra. Our own term *ray*, common indeed to almost all Europe, ancient and modern, is obviously from the same source; and hence the Arabic رايحه (*rayhe*), *fragrancy*, *odour*; the poetic mind of the Arabians uniformly applying this image to legitimate rule and government.

The term *name*, in like manner, runs through all the leading languages of ancient and modern ages, almost without a shade of difference, either

in its meaning or mode of spelling: for we thus meet with it in Hebrew, Sanscrit, Arabic, Greek, Persian, Gothic and Latin.

The same theory might be exemplified from many of the terms significative of the most common animals. Our English word *cow* is of this description, and may serve as a familiar example; גוה (*gouah*), in Hebrew, imports *a herd* (as of oxen); the very same word in Greek, *γύα*, means a yoke of oxen; in both which cases the word is used in a collective sense. In Sanscrit, *gāva* imports, as among ourselves, a single animal of the kind, *ox* or *cow;* in Persian, and ancient Persian or Palavi, it is *gow;* in German, *kuh;* and among the Hottentots, as an example of a savage tongue, *koos* and *koose;* while among the New Zealanders, who have no cows, *eu* imports paps or breasts, the organ of milk.

Mouse is in like manner מושה (*musheh*) in Hebrew, literally "a groper in the dark:" in Sanscrit, *mushica*; in Persian and Palavi, *mush;* in Greek, *μυς*, without the aspirate; in German, *mous;* in English, *mouse;* in Spanish, *musgano:* all, as I have already observed, confederating in proof that the various languages, and dialects of languages, that now are or ever have been spoken, have originated from one common source; and that the various nations that now exist or ever have existed have originated from one common cradle or quarter of the world, and that quarter an eastern region.

Finally, and before I close this argument, and

deduce from it its fair and legitimate result, let me pointedly call your attention to that most extraordinary act of correspondence between all nations whatever, in all quarters of the globe, wherever any trace of the art exists, which is to be found in their employment of a decimal gradation of arithmetic; an argument which, though I do not know that it has ever been advanced before, is, I freely confess to you, omnipotent of itself to my own mind. Let me, however, repeat the limitation, *wherever any trace of this art is found to exist;* for in the miserable state to which some savage tribes are reduced, without property to value, treasures to count over, or a multiplicity of ideas to enumerate; where the desires are few and sordid, and the fragments of language that remain are limited to the narrow train of every-day ideas and occurrences, it is possible that there may be some hordes who have lost the art entirely; as we are told by Crantz is the case with the wretched natives of Greenland *, and by the Abbé Chappé with some families among the Kamschatkadales †; while there are other barbarian tribes, and especially amongst those of America ‡, who cannot mount higher in the scale of numeration than five, ten, or a hundred: and, for all beyond this, point to the hair of their head, as a sign that the sum is innumerable.

* Sect. i. 225. † Sect. iii. 17.

‡ Robertson, vol. ii. b. iv. 91.

But, putting by these abject and degenerated specimens of our own species who have lost the general knowledge of their forefathers, whence comes it to pass, that blacks and whites in every other quarter, the savage and the civilized, wherever a human community has been found, have never either stopped short of nor exceeded a series of ten in their numerical calculations; and that as soon as they have reached this number, they have uniformly commenced a second series with the first unit in the scale, one-ten, two-ten, three-ten, four-ten, till they have reached the end of the second series; and have then commenced a third, with the next unit in rotation; and so on, as far as they have had occasion to compute? Why have not some nations broken off at the number five, and others proceeded to fifteen before they have commenced a second series? Or why have the generality of them had any thing more than one single and infinitesimal series, and consequently a new name and a new number for every ascending unit? Such an universality cannot possibly have resulted except from a like universality of cause; and we have, in this single instance alone, a proof equal to mathematical demonstration, that the different languages into which it enters, and of which it forms so prominent a feature, must assuredly have originated, not from accident, at different times and in different places, but from direct determination and design, at the same time and in the same place; that it

must be the result of one grand, comprehensive and original system. We have already proved, however, that such system could not be of human invention; and what then remains for us but to confess peremptorily, and *ex necessitate rei*, as the fair conclusion of the general argument, that it must have been of divine and supernatural communication?

It may be observed, I well know, and I am prepared to admit the fact, that the examples of verbal concordance in languages radically distinct, and not mere dialects of the same language, are, after all, but few, and do not occur, perhaps, once in five hundred instances.* But I still contend that the examples, few as they are, are abundant, and even super-abundant to establish the conclusion; and the fact on which the objection is founded, instead of disturbing such conclusion, only leads us to, and completely establishes a second and catenating fact; namely, that by some means or other the primary and original language of man, that divinely and supernaturally communicated to him in the first age of the world, has been broken up and confounded, and scattered in various fragments over every part of the globe: that the same sort of disruption which has rent asunder the solid ball of the earth; that has swept away whole species and kinds, and perhaps orders of animals, and

* Compare also with Stewart's Phil. Essays, vol. i. p. 150. 4to. Edin. 1810.

vegetables, and minerals, and given us new species, and kinds, and orders in their stead; that has confounded continents and oceans, the surface and the abyss, and intermingled the natural productions of the different hemispheres; that the same sort of disruption has assaulted the world's primeval tongue, has for ever overwhelmed a great part of it, wrecked the remainder on distant and opposite shores, and turned up new materials out of the general chaos. And if it were possible for us to meet with an ancient historical record, which professed to contain a plain and simple statement of such supernatural communication, and such subsequent confusion of tongues, it would be a book that, independently of any other information, would be amply entitled to our attention, for it would bear an index of commanding authority on its own forehead.

To pursue this argument would be to weaken it. Such a book is in our hands—let us prize it. It must be the word of God, for it has the direct stamp and testimony of his works.

LECTURE X.

ON LEGIBLE LANGUAGE, IMITATIVE AND SYMBOLICAL.

THE subject of the vocal organs, and the scale of tones and terms to which they give rise, which have just passed under review, led us progressively into an enquiry concerning the nature of the voice itself; and the origin of systematic or articulate language.

Systematic or articulate language, however, as we have already observed, is of two kinds, *oral* and *legible;* the one spoken, and addressed to the ear, the other penned or printed, and addressed to the eye. It is this last which constitutes the wonderful and important art of writing, and distinguishes civilized man from savage man, as the first distinguishes man in general from the brute creation. The connection between the two is so close, that although both subjects might, with the most perfect order, find a place in some subsequent part of that comprehensive course of study upon which we have even now but barely entered, I shall immediately follow up the latter for the very reason that I have already touched upon the former. It will, moreover, if I mistake not, afford an agreeable variety to our philosophical pursuits; a point, which

ought no more to be lost sight of in the midst of instruction than in the midst of amusement; and will form an extensive subject for useful reflection when the present series of our labours shall have reached its close.

Written language is of so high an antiquity, that, like the language of the voice, it has been supposed, by a multitude of wise and good men in all ages, to have been a supernatural gift, communicated either at the creation, or upon some special occasion not long afterwards. Yet there seems no satisfactory ground for either of these opinions. That it was not communicated like oral language at the creation of mankind, appears highly probable, because, first, it by no means possesses the universality which, under such circumstances, we should have reason to expect, and which oral language displays. No tribe or people have ever been found without a tongue; but multitudes without legible characters. Secondly, amongst the different tribes and nations that do possess it, it is far from evincing that unity or similarity in the structure of its elements which, I have already observed, is to be traced in the elements of speech, and which must be the natural result of an origin from one common source. The system of writing among some nations consists in pictures, or marks representative of things; among others in letters or marks symbolical of sounds; while, not unfrequently, the two systems are found in a state of combination, and the characters are partly

imitative and partly arbitrary. And thirdly, there does not seem to be the same necessity for a divine interposition in the formation of written characters as in that of oral language. The latter existing, the former might be expected to follow naturally in some shape or other, from that imitative and inventive genius which belongs to the nature of man, and especially in a civilized state. And, as we endeavour to penetrate the obscurity of past ages, we meet with a few occasional beacons which point out to us something of the means by which this wonderful art appears to have been first devised, and something of the countries where it appears to have been first practised.

But an exception is made by many learned and excellent men in favour of one species of writing; namely, that of alphabetic characters, which is conceived to be so far superior to every other method, as to have demanded and justified a special interposition of the deity at some period of the creation; and, by turning to the Pentateuch, a few texts, we are told, are to be met with, which seem to intimate that the knowledge of letters was first communicated to Moses by God himself, and that the Decalogue was the earliest specimen of alphabetic writing.

Such was the opinion of many of the fathers of the Christian church, and such continues to be the opinion of many able scholars of modern times: as, among the former, St. Cyril, Clement of Alexandria, Eusebius, Isidore; and, among the latter, Mr. Bryant, Mr. Costard, Mr.

Windar.* And it is hence necessary to remark in addition to what has already been observed that, so far from arrogating any such invention or communication to himself, Moses uniformly refers to writing, and even to alphabetic writing, as an art as common and as well known in his own day as at present. He expressly appeals to the existence of written records, such as tablets or volumes, and to the more durable art of engraving, as applied to alphabetic characters. Thus, in the passage in which writing is first mentioned in the Scriptures, "And the Lord said unto Moses, *write* this for a memorial in a *book* or *table.*"† And shortly afterwards, "And thou shalt make a *plate* of pure gold, and *grave* upon it like the engravings of a signet, HOLINESS TO THE LORD."‡ The public seals or signets of oriental princes are well known to be of the same description even in the present day, and to be ornamented with sentences instead of with figures or mere cyphers. In the State Paper office, at Whitehall, there are still to be seen a number of letters from eastern monarchs to the kings of England, with seals of this very kind, the inscriptions of several of which are copied by Mr. Astle into his valuable work upon the present subject.§

In that sublime and unrivalled poem, the book

* Compare Astle's Origin of Writing, &c. p. 11. 4to.

† Exod. xvii. 14.

‡ Id. xxviii. 36.

§ Origin and Progress of Writing, p. 14. 4to. 1803.

of Job, which carries intrinsic, and in the present individual's judgment, incontrovertible evidence of its being the work of Moses, we meet with a similar proof of the existence and general cultivation of both these arts, at the period before us; for, it is thus the afflicted patriarch exclaims under a dignified consciousness of his innocence:

> O! that my words were even now written down:
> O! that they were engraven on a table:
> With a pen of iron upon lead: —
> That they were sculptured in a rock for ever! *

Nor do the Hebrews alone appear to have been possessed of written characters at this era. Admitting Moses to be the author of this very ancient poem, we find him ascribing a familiar knowledge of writing, and not only of writing but of engraving and sculpture, to the Arabians; for of this country were Job and his companions. And if, as appears from the preceding passages, the Hebrews were generally acquainted with at least two of these arts at the time of their quitting Egypt, it would be reasonable to suppose, even though we had no other ground for such a supposition, that the Egyptians themselves were equally acquainted with them.

We have also some reason for believing that alphabetic writing was at this very period common to India; and either picture-writing or emblematic writing to China. The Hindu

* Job, xix. 23, 24.

Scriptures, if the term may be allowed, consist of four distinct books, called Baids or Beids, Bedas or Vedas, which are conceived to have issued successively from each of the four mouths of Brahma; and of these, Sir William Jones calculates that the second or Yajur Beda may have been in existence fifteen hundred and eighty years before the birth of our Saviour, and consequently in the century before the birth of Moses: whence, if there be any approach towards correctness in the calculation, the first or Rik Beda must, at the same epoch, have been of very considerable standing. He dates the Institutes of Menu, the son or grandson of Brahma, which he has so admirably translated, at not more than two centuries after the time of Moses; though he admits that these are the highest periods that can fairly be ascribed to both publications *: and is ready to allow that they did not at first exist in their present form, and were, perhaps, for a long time only traditionary. It is impossible not to wish that the facts upon which this extraordinary scholar builds his premises were established with more certainty, and that the conclusions he deduces from them were supported by inferences and arguments less nicely spun. Admitting the existence of these com-

* He calculates the first three Vedas to have been composed about 300 years before the Institutes, and about 600 before the Puranas and Itahasas, which he felt convinced were not the production of Vyasa. Works, vol. ii. p. 305; and iii. p. 484. 4to. ed.

positions in any sort of regular shape on their first appearance, it seems more reasonable to suppose, considering their complicated nature and extent, that they were handed down from age to age in a written form, than that they maintained a precarious life by mere oral tradition; for, if the Egyptians, as appears almost unquestionable, were in possession of legible characters at or before the time of Moses, there seems no solid ground for believing that the Hindus might not have been in possession of a similar art. The different ages of the *Kings*, or five sacred and most ancient books of the Chinese, have been still less satisfactorily settled than the Vedas of the Hindus. A very high antiquity, however, is fully established for them by a distinct reference to their existence in the Institutes of Menu; nor perhaps less so in the very simple and antiquated style in which all of them are written, how much soever the characters of any one of these books may differ from any other: and, adopting the chronology of the Septuagint, Mr. Butler ingeniously conjectures that the era of the Chinese empire may be fixed, with some latitude of calculation, at two thousand five hundred years before Christ*, which would make it nearly a thousand years before the birth of Moses.

"The annals of China," says Dr. Marshman, "taken in their utmost extent, synchronize with the chronology of Josephus,

* Horæ Biblicæ, vol. ii. p. 179. 2d ed. 8vo. 1807.

the Samaritan Pentateuch, and the Septuagint, rather than with that contained in our present copies of the Hebrew text; and, according to the former, the highest pretensions of their own annals leave the Chinese *inhabiting the woods, and totally ignorant of agriculture*, nearly five hundred years after the deluge." * The Y-King, or oldest of their sacred books, consists of horizontal lines, entire or cut, which are multiplied and combined into sixty-four different forms or positions. They appear involved in almost impenetrable mystery, as well as antiquity; but, so far as they have been deciphered, they seem, in conjunction with the other sacred books, to contain a summary of patriarchal religion, or that which alone ought to be regarded as the established religion of China; under which the people are taught to know and reverence the Supreme Being, and to contemplate the emperor as both king and pontiff; to whom, exclusively, it belongs to prescribe ceremonies, to decide on doctrines, and, at certain times of the year, to offer sacrifices for the nation.†

It becomes me, however, to observe that, with all the researches of our most learned writers, we are still involved in a considerable degree of uncertainty concerning the chronology of several of the Oriental empires, and still more so

* Elements of Chinese Grammar; with a Preliminary Dissertation on the Characters and Colloquial Medium of the Chinese. Serampore. 4to. 1814.

† Lettres Edif. et Cur. tom. xxi. p. 218. 1781.

concerning their most ancient publications. M. Freret and M. Bailly, generally speaking, concur in the periods assigned to the earliest Oriental writings by Sir William Jones; but the pretension of several of them, and especially of the Puranas, or series of mythological histories, to a very high antiquity, has lately been powerfully attacked by Mr. Bentley, in his dissertation on the Suryá Siddhanta *; and still later by Captain Wilford, in his series of Essays on the Sacred Isles of the West†; and a fall in the pretensions of these may probably be succeeded by a like fall in those of various others. ‡

* Butler, p. ii. ut supr. p. 175. Asiatic Researches, vol. vi.

† Asiatic Researches, vol. x. See also Edin. Rev. No. xxxii. p. 387—389. The difference is indeed wonderful; for while Sir William Jones reckons the Puranas at nearly 2500 or 2600 years old, "it is evident," says Mr. Bentley, "that none of the modern romances commonly called the Puranas, at least in the form in which they now stand, are older than 484; and that some of them are compilations of still later times."—Asiatic Researches, vol. viii. p. 240. And to nearly as late a date are they assigned by Mr. Wilford: "They are certainly," says he, "a *modern* compilation from valuable materials, that, I am afraid, no longer exist. An astronomical observation of the heliacal rising of Canopus mentioned in two of the Puranas puts this beyond doubt." Id. vol. p. 244. Mr. Coleman is of this same opinion; at least in respect to one of them, the Sri Bhagaveta; which, he further tells us, is considered even by many of the learned Hindus as the work of a grammarian supposed to have lived about 600 years ago. Id. vol. viii. p. 487.

‡ There is a doubt which has the best claim to the highest antiquity, the religion of Boodh or that of Brahma. One of

Even China, at the time of Moses, according to the statement of their own writers, had not long emerged from a state of the grossest barbarism. It is admitted in the Lee K'hee, that, during the reigns of Yaou and Shun, or about two thousand years before Christ, the people, as

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the most authentic accounts we have of the former is that transmitted to the American Board of Missions by Mr. Judson, a man of great excellence and intelligence, who has resided in the Burman empire as a missionary, at Rangoon or at Ava, from 1814, to, I believe, the present time; to which I shall also have occasion to advert hereafter. Mr. Judson is intimately acquainted with the language, the customs, and established creed of the Burman empire; and, according to his account, the priests of Boodhism, though they claim for themselves a higher origin than those of Brahma, make no pretence to an extravagant antiquity. "Boodh," says Mr. Judson, "whose proper name is Gaudama, appeared in Hindoostan about TWO THOUSAND THREE HUNDRED YEARS AGO, and gave a new form and dress to the old transmigration system, which, in some shape or other, has existed from time immemorial. The Brahmans, *in the mean time*, dressed up the system after their fashion; and both these modifications struggled for the ascendancy. At length the family of Gaudama, which had held the sovereignty of India, was dethroned, his religion was denounced, and his disciples took refuge in Ceylon, and the neighbouring countries. In that island, about 500 years after the decease and supposed ANNIHILATION OF THEIR TEACHER OR DEITY, they composed their sacred writings in the Sanscrit which had obtained in Ceylon; whence they were conveyed by sea to the Indo-Chinese nations (those of the Burman empire). Boodhism, however, had gained a footing in Burmah before the arrival of the sacred books from Ceylon. It is commonly maintained that it was introduced by his emissaries before his death." *Correspondence*, 1819.

we have just observed, were living in a savage state, in woods and caves, and holes dug in the ground; covering themselves with the skins of beasts, and rude garments formed of the leaves of trees, grass, reeds, and feathers. Even one thousand years later, or during the dynasty Chow, their states or clans amounted to not less than eighteen hundred, each of which had its chieftain, who possessed absolute and hereditary power; though all united in acknowledging the supremacy of this family and conceding to it the imperial dignity. It was only about two hundred years before our own era that these clans were reduced to seven; and some time afterwards that Che-hwang-he, the first emperor of the dynasty T'sin, succeeded in amalgamating the whole into one vast and massy despotism, the great outlines of which continue to the present day. * Yet, as far down as nine hundred and eighteen years before Christ, or about five hundred years before the era of Confucius, notwithstanding their symbolical characters and sacred books, in use among the learned, Dr. Milne affirms, from their own historians, that generally speaking they were barbarians in literature as well as in manners, and could "neither read, nor write, nor cypher." † And I may here add, that whatever

* Part iv. sec. 9. See Milne's Retrospect of the First Ten Years of the Protestant Mission to China. Malacca Press. 8vo. 1820. p. 18.

† Kwoh-tseh. Pref. p. 1. Milne, ut supr. p. 20.

were their writings, and by whomsoever written, in earlier ages, the Chinese have, at this day none of a higher date than those composed by Confucius himself, five hundred years before our own era, or compiled by him from rude and imperfect copies of more ancient productions, for the most part indented on plates or pieces of wood rather than transcribed on paper.

Upon the whole, however, the conclusion I have ventured to advance seems to be strengthened by the general tenour of the inquiry into this subject, and affords us additional ground for believing that the art of writing, even by the use of alphabetic characters, instead of having been communicated to Moses by some special interposition of the Deity, was, in his day, as familiar to his countrymen as to himself; that it was generally known throughout Egypt, and, perhaps, cultivated over various parts of Asia.

Contemplating written language, therefore, as of human invention, let us next enquire into the most probable means by which it was invented and brought to perfection; and the countries in which it originated.

Supposing *, by a miracle, the world were now to be reduced to the state in which we may conceive it to have existed in its infancy; and

* A few pages of this lecture, particularly adapted to the occasion, were introduced into an article in the British Review for 1811, at the request of the writer's friend, who was at that time its editor; and may be found in the analysis there given of Dr. Marshman's Elements of Chinese Grammar.

every trace and idea of written language were to be swept away, and the only means of communication to be that of the voice, what would be the mode most likely to be resorted to of imparting to a deaf person, or a foreigner ignorant of our dialect, a knowledge of any particular fact or thing with which we might wish him to be acquainted? The reply is obvious: we should point at it if in sight; and if not, endeavour to sketch a rude drawing of it; and thus make one sense answer the purpose of another. This is not mere fancy but manifest and experimental fact; it is the plan actually pursued in most institutions for instructing the deafly-dumb, and the elementary system by which they acquire knowledge. In such establishments, however, it is the elementary system alone; for the use of letters significative of words or sounds is, in every respect, so far superior to that of pictures significative of things, that the latter is uniformly dropped as soon as ever it has answered its purpose and served as a key to the former.

But we are at present adverting to a state of things in which letters are supposed not to exist; and the only established mode of communicating between man and man is that of vocal language. Under such circumstances, the most natural method of conveying ideas to a person unacquainted with our tongue must be, as I have already observed, to point at the things to which they relate if at hand, as all savage nations are well known to do; and if not at

hand, to trace out a rude sketch of them on the sand, the bark of a plant, or some other substance. In this manner the idea of a horse, a house, a dog, or a tree, may, as single objects, be as distinctly communicated as by alphabetic characters; while two or more houses may be made significative of a town, and two or more trees of a wood; and, by thus continuing to copy in successive series such things or objects of common notoriety as the train of our ideas might call for, a kind of connected narrative of passing events might be drawn up, which, though not calculated for minute accuracy, might be generally understood and interpreted.

This kind of language would be fairly entitled to the appellation of *picture-writing;* it would give the images of things instead of the symbols of sounds or words. In its scope, however, it must be extremely limited, for though conveniently adapted to express embodied forms, it must completely fail in delineating pure mental conceptions, abstract ideas, and such properties of body as are not submitted to the eye; as wisdom, power, benevolence, genius, length, breadth, hardness, softness, sound, taste, and smell.

Our next attempt, therefore, would be to remedy this deficiency: and the common consent of mankind in ascribing peculiar internal qualities and virtues to peculiar external forms, would enable us to lay hold of such forms to express the qualities and virtues themselves.

Thus the figure of a circle might be made to signify a year; that of a hatchet, separation or division; that of an eye watchfulness or providential care, if open: and sleep or forgetfulness, if closed; the figure of a harrow might represent a ploughed field; and of a flag a fortress; a rosebud, odour; and a bale of goods, commerce.

Upon the same principle compound ideas might be expressed by a combination of characters; the character expressive of a man in the midst of that expressive of an inclosure, as a square, for example, might denote a prisoner; and an union of those significative of mouth and gold might import eloquence. And we hence advance to another kind of imitative characters, those of a mixt kind, and which are called ALLEGORICAL, or EMBLEMATIC WRITING.

It is obvious that legible language must be very considerably improved by such an accession of power; that it must become both more manageable and more comprehensive. It is obvious, also, that in a variety of abstract subjects, as those of philosophy or religion, the allegorical characters alone might be employed as a medium of communication; and that, by attaching an esoteric or concealed, instead of an exoteric or general, meaning to each, it would form a language of impenetrable privacy — a language from which every one would be shut out excepting those who might be in possession of its key.

The persons to whom we should chiefly look for learning and science in the state of the

world to which I am at present adverting would be the priesthood; or that elevated order which, among all uncultivated nations, concentrates in itself the three professions of law, medicine, and theology. It is amongst this order, therefore, that we should chiefly expect to meet with proofs of both these kinds of visible language; and hence, both kinds might also be fairly denominated HIEROGLYPHIC WRITING, or that of SACRED IMPRESSIONS. Thus, indeed, they have been denominated generally; the pure picture-writing being distinguished by the term curiologic hieroglyphs; and the allegorical, tropical or symbolic hieroglyphs.

Such kinds of picture-language, however, even with this improvement, must be attended with very considerable labour; and hence, from a desire to abbreviate that labour, we may readily conceive that the pictures or imitative characters would soon become simplified and contracted.

The idea of a MAN, formerly represented by his whole figure, might now be signified by his legs alone, as a simple acute angle, like a Greek Λ, which is the written character for a MAN in the Chinese tongue, the whole figure being supposed to have been employed at first; that of HAND, formerly represented by a perfect drawing of this organ, might be contracted into a Greek ψ, or rather the figure of Ψ, which is the old Chinese expression for this purpose, being a rude or rapid outline of the wrist, palm, and fingers; while the idea of UNION or FRIENDSHIP,

at first denoted by two such figures conjoined, as ΨΨ, might subsequently be abreviated into 𝛹, which, in like manner, is the old Chinese written sign for both these ideas. Ingenuity, thus set to work, would soon be able to form a like device for the auxiliary parts of speech; concerning which it may be sufficient to observe that most of the prepositions might be expressed by some simple mark, whose precise meaning should be determined by its relative situation. Thus a plain horizontal stroke, as —, placed at the foot of a noun, might import UNDER it, and at its head ABOVE it; which is, in fact, the very device had recourse to in the old written language of China; so that the sign for MEASURE, with a horizontal line over it, imports ABOVE MEASURE, and below it, UNDER MEASURE; while, in the ordinary mark for HAND, as noticed above, the cross line is turned to the left to express LEFT-HAND, as 𐤟, and to the right to express RIGHT-HAND, as 𐤠; for both which, however, a somewhat different form is used in the present day.

In this manner picture-characters or images would insensibly become converted into arbitrary characters; which, to those acquainted with the meaning of the different marks, would answer the purpose as well, and would have an incalculable advantage in the facility of writing them.

We have now reached the utmost pitch of perfection which the legible language of *things*

is, perhaps, capable of attaining. It has one superiority over that of *words*, or marks characteristic of *sounds;* namely that, when the pictures are drawn at full length, or, if abbreviated, where the key of the abbreviation is known, it is a species of writing addressed to all nations, and may be interpreted without a knowledge of their oral tongues. It speaks by painting, and appeals to what all are acquainted with. And hence M. Leibnitz, and many other philosophers, have conceived an idea that a system of pasigraphy or universal writing, a language of human thoughts, might be founded * upon some such invention.

It is easy to perceive, however, without any detail of facts, that such a system could never be carried into full effect amongst different nations; and that, plausible as it may appear at first sight, it must be loaded with inconveniences, and be equally defective and burdensome, even among people of the same empire. It is easy to conceive, to adopt the language of Sir George Staunton, as applied to the most perfect system of the kind that has ever been actually carried into execution, that it would consist of "a plan of which it may justly be said, that the practice is no less inconvenient and perplexing than the

* See here also Northman's Panography, Repertory of Arts, ii. 307. iii. 91. Langlois's Pantograph, Mach. A. vii. 207. Lodwick's Universal Alphabet.

theory is beautiful and ingenious." * If a distinct character were to be employed to represent every distinct idea, the number of distinct characters would be almost incalculable: if a few distinct or simple characters only were to be made use of to represent such ideas as are most common, and the rest were to be expressed by combinations of these, though the number of distinct characters would be in some degree diminished, the memory would still have a difficult task to retain them; and the combinations would, in a thousand instances, be embarrassing and intricate.

Under this pressure of evils there can be no doubt that a contemplative mind, in whatever part of the world placed, would soon begin to reflect on the possibility of avoiding them, by making the contracted characters now in use, or any other set in their stead, significative of sounds or words rather than of things or images. By minute attention it would soon be discovered, that such an art, which would require, indeed, a general convention or agreement in order to its being generally embraced or understood, might be effected with less difficulty than would at first be imagined. It would be perceived that the distinct articulate sounds in any or in every language, as I had occasion to observe in our last lecture, are not many, and in every language are the same or nearly so: that in few languages

* Ta Tsing Leu Lee. Pref. p. xiv.

they exceed twenty, and in none, perhaps, thirty * ; and that consequently from twenty to thirty arbitrary marks or alphabetical characters might be ample to express every simple sound, and, by their combinations, to denote every separate word or intermixture of sounds † : whence a written language might be formed, addressed to the ear instead of to the eye, symbolical of oral language, and, of course, possessing the whole of its accuracy and precision ; and as much more easy of attainment, as it would be more definite and comprehensive. ‡

* " Mr. Sheridan says the number of simple sounds in our tongue are twenty-eight. Dr. Kenrick says we have only eleven distinct species of articulate sounds ; which, even by contraction, prolongation, and composition, are increased only to the number of sixteen ; every syllable or articulate sound in our language being one of this number. Bishop Wilkins and Dr. William Holden, speak of about thirty-two or thirty-three distinct sounds." — Astle, p. 18.

† Tacquet asserts, that the various combinations of the twenty-four letters (without any repetition,) will amount to 620,448,401,733,239,439,360,000. — Arithm. Theor. p. 517. ed. Amst. 1704. Clavius makes them only 5,852,616,738,497,664,000. In either case, however, it is evident " that twenty-four letters will admit of an infinity of combinations and arrangements sufficient to represent not only all the conceptions of the mind, but all words in all languages whatever." Astle, p. 20. — In like manner ten simple marks are found sufficient for all the purposes of univeral calculations which extend to infinity : and seven notes, differently arranged, fill up the whole scale of music.

‡ De Brosses, sur l'Origin de l'Alphabet.

I have thus drawn a sketch of what there can be little doubt would be the case provided mankind were at this moment to be deprived by a miracle of all legible language, and reduced to the state in which we may conceive the world to have existed in its earliest ages. The art of writing would commence with imitative, and terminate in symbolical, characters; it would first describe by pictures or marks of things addressed to the eye, and after having passed through various stages of improvement would finish in letters, or marks of words addressed to the ear.

This is not a speculative representation; for I shall now proceed to show, as far as the period of time to which we are limited will allow me, that what we have thus supposed would take place, has actually taken place: that wherever alphabetic characters exist, or have existed, we have direct proofs, or strong reasons for believing, that they have been preceded by picture or imitative characters; and that wherever picture or imitative characters, the language of things, still continue to exist, instead of having been preceded by alphabetic characters, they have a strong tendency to run into them, and probably will run into them in the upshot. And in this view of the subject I am supported by many of the most celebrated philologists of the age, as Bishop Warburton, the President de Brosses, Mr. Astle, M. Fourmont, M. Gibelin.

The remains of Egyptian sculpture are but few; but they are sufficient to afford us specimens of each of the kinds of writing I have

adverted to; the pure hieroglyph, or simple picture-style; the mixt, allegorical, or emblematic; the abbreviated or contracted; and the alphabetic; and the valuable relics which are to be seen in the British Museum, more especially the sarcophagi and the famous Rosetta stone, (as it is called,) erected in honour of Ptolemy V., contain examples of most of them. They prove to us also, the order of succession in which the changes were effected, and clearly indicate the pure picture-style to be the most ancient.

The magnificent ruins of Persepolis, the capital of ancient Persia, offer monuments to the same effect. The windows, the pillars, the pilasters, and the tombs, are loaded with characters of some kind or other, imitative, emblematical, or alphabetical. In many instances the pure picture-style is as correctly adhered to as in any Egyptian specimen; in others we meet with tablets filled with what may indeed be abbreviated emblems, but which appear to be letters; and which, at any rate, afford proof that the ancient Persians had, at this period, made some advance from characters for things towards characters for words.

The prophecy of the utter destruction of Babylon has been so completely fulfilled, that, although the banks of the Euphrates, on which this city stood, give evident proofs of magnificent ruins along their track, we cannot exactly ascertain its situation. On many of the bricks, however, which have been dug up from the midst of the general wreck, we find a peculiar sort of

character, evincing an approach towards letters, and which are supposed to be abbreviated emblems, as emblems are often abbreviated pictures, employed by the Chaldean sages of Babylonia; who, according to Pliny, always engraved their astronomical observations on bricks.* And even in Southern Siberia, as high as the river Irbit, or Pishma, Strahlenberg asserts, that he found a variety of rude figures or emblems engraven on the rocks†, which seem to have preceded the use of the Tartar or Mantcheu alphabet.

In America we meet with traces of picture-writing amidst the most savage tribes; every leader on returning from the field endeavouring to give some account of the order of his march, the number of his adherents, the enemy whom he attacked, and the scalps and captives he brought home, by scratching with coarse red paint a certain display of uncouth figures upon the bark of a tree, stripped off for this purpose. "To these simple annals, he trusts for renown, and soothes himself with a hope, that by their means he shall receive praise from the warriors of future times."‡ The Mexicans are well known to have acquired such a degree of perfection in this style of writing, that on the first arrival of the Spaniards on their coasts expresses were sent off to Montezuma, the reigning monarch, containing an exact statement of the fact, together with the number and size of the different ships, by a series of pictures alone,

* Plin. vii. 56. † De Vet. Lit. Hun. p. 15. Astle, p. 6.
‡ Robertson's America, vol. iii. b. vii. p. 303. Astle, p. 6.

painted on the cloth of the country. It was thus this people kept their public records, histories, and calendars. We are still in possession of several very curious specimens of Mexican picture-writing, some of which exhibit several of the very emblems I have just adverted to, as those which would probably be had recourse to in our own day, were we miraculously to be deprived of all knowledge of alphabetic writing; as, a bale of goods to represent the idea of commerce, and a rose-tree that of odour. The most valuable specimens, however, of Mexican picture-writing, are those obtained by Mr. Purchas, and published in sixty-six plates, divided into three parts; the first containing a history of the Mexican empire under its ten monarchs; the second, a tribute-roll, representing what each conquered town paid into the royal treasury; and the third, a code of Mexican institutions, domestic, political, and military. Various other specimens are to be met with in different parts of Spain, and especially in the Royal Library at the Escurial; and a folio volume in the Imperial Library at Vienna. Along with the full pictures we occasionally meet, in some of these national archives, with emblems, or a prominent feature put for the whole figure; and in others with various symbols or arbitrary characters, making an approach towards letters; and thus confirming the progress from pictures to arbitrary signs which I have endeavoured to establish.

The written language of the Chinese, however, is carried to a still higher pitch of perfection;

and is, perhaps, rendered as perfect as the system upon which it is founded will allow. It is still altogether a language of things, and was formerly very largely, if not altogether, a language of pictures. The pure picture-style is admitted by themselves to have been the oldest, or that first invented, and they expressly denominate this order of characters *siang* or *hing*, "form or image." "The picture," however, observes Dr. Morrison, "does not appear to have ever been intended as an exact representation, such as the picture-writing of Mexico, or the hieroglyphics of Egypt, but only a slight outline."* This kind of style is now become obsolete, and is rarely to be met with; but of the next series, or that into which the original or siang style was first transformed, which they call Yu-tsu, probably from the name of the great emperor Yu, or Chow, in whose era the transformation is said to have occurred, it is no uncommon thing to meet with specimens on rings, seals, and other public instruments. These are strictly abbreviated pictures, such as symbols or emblems of some kind or other. But the characters now in use are abbreviations of these abbreviations; and hence have, for the most part, the appearance of being arbitrary marks, though we can still so frequently trace the parent image, as to decipher their origin and reference.

The Chinese is an extraordinary language in every respect. Its radical words do not exceed four hundred and eleven; every one of which is a monosyllable. But, as it must be obvious, that

* Chinese Miscellany.

these can by no means answer the purpose of distinguishing every external object and mental idea, unless varied in some way or other, every one of these four hundred and eleven words is possessed of a number of different tones and combinations with other words; and every tone or combination signifies a different thing; so that the whole vocabulary, limited as it is, may be readily made to express several thousands of ideas. Thus the word *fu*, which enters into the well-known compound Kong-fu-tsee, or Confucius, pronounced in different manners, imports a *husband* or *father*, a *town*, and various other ideas. So *khoû*, imports a month; but pronounced nasally, as *khoong*, it denotes *empty;* and thus the word *shu*, differently uttered, means both a *lord* and a *swine*.

The whole of the elementary marks, or keys as they are called, by which the ideas of this language, for it is not the language itself, are written down and communicated, are still fewer than the elementary words; for they are only two hundred and fourteen, and express such ideas alone as are most common and familiar; as those of *plant*, *hand*, *mouth*, *word*, *sun*, *nothing*, *water;* every other idea being denoted by compounds, or supposed compounds of these elementary marks. Thus, the mark for a thicket, if doubled, implies a wood; an union of the two characters of a man and a field signifies a farmer; the characters of a hand and a staff united, import parental authority, or a father; and it is from like characters I have selected the specimen

of symbols which I have mostly submitted to you as some of those which would probably be invented in the present day, if, by a miracle, we were suddenly to be deprived of all knowledge of alphabetic writing.*

* The following table, compared with the remarks offered in page 324, will more clearly illustrate the pictorial origin of the Chinese characters.

The whole are usually divided by the native philologists into six classes, the first four of which will best serve as exemplifications.

I. IMAGES: a name given to characters which, in their antiquated form, show very clearly a rough representation of the material objects they denote: as,

	Ancient Form.		Modern Form.
Jo		the Sun, now written	日
Youĕi		the Moon,	月
Chân		a Hill,	山
Moŭ		a Tree,	木
Khiouan		a Dog,	犬
Jû		a Fish,	魚
Ma		a Horse,	馬
Moŭ		the Eye,	目
Tcheôu		a Boat,	舟
Kiû		a Cart,	車
Choùi		Water,	水
Eûl		the Ear,	耳
Jin		a Man,	人
Kheoù		Mouth,	口
Choùi		Water,	氵

Of this sort there are about 200 characters.

By combinations of this kind, the two hundred and fourteen elementary characters, like the four

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II. Associates: meaning words formed by a combination of two or more Images: as,

Mîng Brightness, now written Sun & Moon united.

Siân a Hermit, - - Man and Hill.

Mîng Note of a Bird, - - Mouth and Bird.

Wén to Hear, - - - Door and Ear.

Loúi Tears, - - - Water and Eye.

Their number is very great.

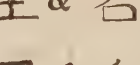
Koo-kin "Eloquence," "Fluency of Speech," literally, "Golden-mouth;" the mark for mouth, which is (two lips), being united with the mark for gold, which is the remainder of the character. In Greek χρυσόστομος, *aurea verba ore fundens.*

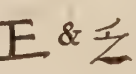
III. Indicants, or Pointers: from their indicating or pointing out the relative form or position of what is predicated: as,

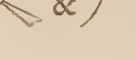
Cháng		Above, -	now written
Hiá		Below, - - -	
Schoûng		the Middle, - -	
I		One, - - -	
Eúl		Two, - - -	
Sân		Three, - - -	

IV. Antithetics, or Contraries: formed by inverting or reversing the character; and hence acquiring an antithetic or correspondent signification: as,

Modern Forms.

Tio Left Hand, reversed is Géou Right Hand, 

Tchîng { standing up: and, hence, "Correct," "Proper." } Fa { Lying down, and, hence, "Defect." } 

Jîn a Living Man Chî Dead Body, 

hundred elementary words, are wonderfully increased, and are daily increasing; while the greater mass have so little resemblance to any one of the genuine elements that the philologists of the present day regard many of them as primitive or independent signs, formed long subsequently to the invention of the proper elements, and combined, like themselves, in various ways.

I have said that the sum total of Chinese characters derived from these sources is perpetually increasing; and have also hinted, that from this natural tendency, the language must at length become an intolerable burden even to the most assiduous Chinese scholar. Thus, while all the characters that occur in Confucius, in Mung, and the five Kings, or sacred books, forming together more than twenty volumes, fall considerably short of six thousand, including the nu-

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Most of the Chinese characters may be classed under one of these four heads. The two remaining classes do not appear to be so intimately connected with a pictorial origin.

The two hundred and fourteen elementary keys, or radicals of the language, are divided into seventeen classes, according to the number of strokes of which each element or radical consists. It is probable, however, that all the more complicated, and indeed, great numbers of all those that possess more than five or six strokes, are as strictly compounds as any in the language, though the lexicographers are incapable of reducing them to their constituent principles; and hence allow them to stand as primitives among such as are of simpler construction: and hence the total number of primitives are reckoned at about sixteen hundred, each of them producing from three to seventy-four derivatives; and hereby constituting the great mass of the Chinese written language.

merous unusual words found in the four volumes of the Shu; (and I may add, that the scope is much the same in the celebrated ethical comment of Tung-tsee, the favourite disciple of Confucius, denominated Ta-hyoh, "the Great Sublime or Momentous Doctrine," as also in the Choong-yoong, Zun-zu, and Mun, constituting, conjointly, the four books most revered next to the Kings;)—such has been the accession of new terms invented by subsequent writers, and often with a forgetfulness of the old, which have hereby been suffered to become obsolete, that M. de Guignes was able, in his day, to collect and put into his dictionary eight thousand characters; the six national dictionaries that were chiefly in use about a century since, give from fifteen to about thirty thousand; and lastly, the Imperial Chinese Dictionary, composed by order of the emperor Kang-khee, in 1710 of our own era, comprises not less than forty-three thousand four hundred and ninety-six characters!

Dr. Marshman, in his valuable "Elements of Chinese Grammar," observes that, in the Imperial Dictionary these stand arranged as follows:

Characters in the body of the work - - -	31,214
Added, principally obsolete and incorrect forms of others - - - - - - - -	6,423
Characters not before classed in any dictionary	1,659
Characters without name or meaning - -	4,200
	43,496

We have here, therefore, a confession by the Chinese lexicographers themselves, that upwards

of ten thousand of the characters admitted into the Imperial Dictionary, being nearly a fourth of the whole, are useless, and for the most part unintelligible, in the present day; independently of which, "a considerable number," observes Dr. Marshman, "of the 31,214 characters adopted from the former dictionaries have no meaning affixed to them; but are merely given as obsolete, or current but incorrect forms of other characters, to which the compilers of the dictionary have referred the reader for their meaning." * Whence we may fairly conclude that, of the characters which are still allowed to figure away in the written language of China, nearly half of the whole convey no ideas whatever, and are altogether representatives without constituents.

Were we able to follow even the latest of these up to their origin, and to prove that they have not issued, in the remotest manner, from the two hundred and fourteen elementary marks, which Dr. Marshman has endeavoured to do, we should probably still find them derived in the same manner from forms or symbols of things, and that they were at first direct imitations or conventional representatives; still, as I have already shown, united and compounded, or in some other way modified to express abstract or complicated ideas. It must be obvious, however, that characters thus constituted must be very

* Elements of Chinese Grammar, with a preliminary Dissertation on the Characters and Colloquial Medium of the Chinese, &c. By J. Marshman, D.D. Serampore, 1814. 4to.

loose and perplexing; and such, in fact, they are often found to be, by the most expert and best instructed natives. It must be obvious, at the same time, that a system of picture-writing, thus constructed and perfected, may, in a considerable degree, answer the purpose of alphabetic marks*;

* Amongst the numerous and important Library establishments of the present day, one has lately been opened by the co-operation of a committee of enlightened and public-spirited individuals, for a regular course of instruction by lectures in many of the most extensively spoken languages of the East, and, among the rest, in Chinese. The President is Lord Bexley; among the Vice-Presidents are Sir George Staunton, Bart., and Sir T. R. Raffles; its situation is in Bartlett's Buildings, Holborn; and while instruction in these valuable branches of literature is hereby offered to every one, it is *gratuitously* bestowed on all Christian Missionaries who are desirous of taking advantage of its benefits. It is, hence, emphatically denominated, a "LANGUAGE INSTITUTION IN AID OF THE PROPAGATION OF CHRISTIANITY," and few establishments of the present day are more entitled to the support of the nation, or of the world.

It should be further stated, moreover, in order to excite the fullest confidence of the public, that the Professor in the Chinese department is the Rev. Dr. Morrison; while those in the Arabic, Persian, Bengalee, and Sanscrit are nearly of equal celebrity, and have the occasional assistance of Professor Lee, of Cambridge; and that all of them have entered into the undertaking with so much zeal and public spirit as to afford their valuable assistance gratuitously.

Nor has this instruction been offered in vain or unsuccessfully. Even in the Chinese department, where many might expect least to be accomplished, the very learned and excellent Professor, in his first Quarterly Report to the Committee, March 1, 1826, has stated, that he has been attended by thirteen students, seniors and juniors, besides several ladies; with the progress of most of whom he has had great reason

and it is doubtless owing alone to the perfection which this system of writing had acquired in Mexico, and still exhibits in China, that the ingenious people of both countries stopped so long at the point of abbreviated emblems, significant of objects, and never fairly advanced

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to be satisfied: and two or three of whom, having attained some previous knowledge of the language, are preparing to carry on the design after his own return to China.

The Institution is also under a deep and inexpressible obligation to Dr. Morrison, for the gratuitous use of his most valuable Chinese library, — by far the first in Europe, — and, perhaps, any where out of Asia; which is now deposited and arranged at the establishment. As a matter of high literary curiosity, I have requested its distinguished owner to furnish me with a brief account of the library for insertion in the present place, and my reverend friend has been kind enough to comply by the following communication, which I give in his own words :—

" In the Language Institution there is deposited an extensive library of Chinese printed books and MSS., together with a museum intended to illustrate subjects referred to in the books. This Library and Museum are the property of Dr. Robert Morrison, the first Protestant missionary to China.

" There are between nine hundred and a thousand works; making in all about 10,000 volumes, stitched and bound in the Chinese manner.

" These books contain specimens of the literature of more than three thousand years; from the compilations and original writings of Confucius, five hundred years before the Christian era down to the present time.

" The materials from which Confucius compiled the works he put forth, are not extant in any other form than that which he gave them; and, therefore, he may be regarded as the oldest Chinese writer whose works have come down to the present day. " Dr.

from a legible language for things, to a legible language for words.

It should be observed, however, as a farther proof of the tendency of picture-characters to advance towards literal, that even in China itself the Mantcheu, or Tartars, have an alphabet, or system of verbal writing, and that the Mantcheu practice has long been acquiring a growing reputation. It should be observed, also, that the Chinese characters themselves have of late been resorted to at Canton, and by Chinese natives, as merely expressive of sounds, and been employed in the formation of an English vocabulary; in consequence, as Sir George Staunton remarks, of the great concourse of persons residing at this station who use the English language. * In like manner the

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"Dr. Morrison has not had time, during his sojourn in Europe, to make out a Catalogue Raisonné of his Chinese library, with a brief account of the chief works, their titles, subjects, authors, date, &c.

"They consist of the sacred books of Chinese antiquity, with copious commentaries, written at various periods, and by a great variety of persons; history, ancient and modern; geography, and topography; astronomy; biography; opinions on government; rites and usages of China; religious books of *Laoukeunism; Budhism;* and the morals of *Confucianism;* poetry; historical and other novels; medicine; botany; and the materia medica; notices of foreign nations, and embassies to China; works composed by Jesuit missionaries concerning Europe and Christianity; the European geometry; and the astronomy of the fifteenth century, &c.; a few works on the religion of Mahomet, &c. &c."

* Embassy, ii. 576; Hager's Chinese Elements, p. lxi.

Japanese, fond as they are of copying from the Chinese, have long since departed from their system of marks for things, and addicted themselves to alphabetic characters; sometimes writing them horizontally, and sometimes perpendicularly; both which methods are found in Chinese records, though the perpendicular is by far the most common.

Attempts have been made to prove that the picture-writing of the Egyptians, the Chinese, and the Mexicans, has proceeded from one common source; yet nothing can be more fanciful, and, apparently, nothing more unfounded; for each possesses a distinct style, derived from an attachment to distinct classes of images, for the most part of a local nature; as the sea-horse, the crocodile, the ibis, the ichneumon, the lotus, and papyrus, birds and other animals with human heads, and men with the heads of birds and dogs, in the Egyptian system; the rabbit, cane, reed, flint, house, flag, and circle in the Mexican; and cross, parallel, crooked, and angular lines, as the abbreviated symbols of pictures, in the Chinese; derived, for the most part, as Dr. Morrison ingeniously conjectures, from the impressions of the feet of birds on the sand, and the lines on the bodies of shell-fishes.* Each has had a distinct origin, according as mankind in these different parts of the world, and under different circumstances, have found a necessity for recording facts and ideas in remote periods of antiquity; and each, as I have

* Chinese Dictionary, p. 1.

already observed, has an obvious tendency to run into arbitrary, and, ultimately, into alphabetical characters, though of different forms and descriptions.

Of all these, the system whose origin we are, perhaps, best capable of tracing historically, is the Phœnician; and here the voice of history completely coincides with the theory now advanced. The oldest Phœnician historian, whose writings have reached us in a few fragments and quotations, is Sanchoniatho, who was contemporary with Solomon, and drew up a history of Phœnicia, from existing monuments, and archives preserved in the college of the Phœnician priests. This history was dedicated to Abibalus, the Phœnician monarch, father of Hiram, king Solomon's ally; and was allowed by the king and the official censors appointed to examine it to be a work of great truth and accuracy. In this history Sanchoniatho places mankind, on their first creation, in Phœnicia; and gives us a genealogy of the Patriarchs, from Adam, or Protogonus, as he calls him, to Taaut, Athoth, or Hermes, the successor of Menes, the first king of Egypt. In a passage of this very curious history, preserved by Eusebius, the author distinctly states, that picture-writing was invented by Ouranus, king of Phœnicia, who appears to have been contemporary with Misor or Misraim, the son of Ham; and that Taaut, the son of Misor, improved upon and abbreviated the picture-writing of Ouranus, either during the reign of Ouranus or of his son Cronus, or

Saturn; and that Cronus having given Taaut the throne of Egypt, upon the death of Menes, the Egyptian monarch, the latter carried with him this improved picture or symbolical writing into that country. And in another passage he asserts that Taaut afterwards carried forward this improvement to the invention of alphabetic characters. "Misor," says he, "was the son of Hamyn; the son of Misor was Taaut, who invented the first letters for writing. The Egyptians call him Thoth; the Alexandrians, Thoyth; and the Greeks, Hermes, or Mercury." He tells us, in a third place, that having thus invented letters, Taaut ordered the Cabiri and Dioscuri, the priests and sages of the country, to employ them in drawing up a history of Phœnicia.

This is a very curious and important relic of profane history; and it is interesting to observe its coincidence with the Mosaic narrative. It makes no mention, indeed, of the deluge, and it introduces two more generations in the line of Cain, from Protogonus, or *first-formed*, as the term literally implies (the Adam of Moses), to Agroverus, or Noah. It places, however, the first race of mankind in Phœnicia, which, in the latitude in which this term was generally understood, included, as I shall have occasion to show presently, the banks of the Euphrates, on which Moses fixes the garden of Eden: it allows nearly the same period of time between the creation and the era of Misor, or Misraim; and nearly the same number of generations as Moses

does; and gives, as closely as may be, the same names to the son and grandson of Noah,—Ham and Misraim being merely transmuted into Ham-yn and Misor. There is coincidence enough in the two accounts to reflect authenticity upon each other: and had there been more, an advantage would eagerly have been taken of the Phœnician narrative, by sceptical polemics, and Moses would have been boldly accused of having stolen his history from this quarter.

This account of Sanchoniatho, moreover, is not only supported generally by the sacred records, but is distinctly corroborated in regard to the point immediately before us, that of the invention of letters, by the suffrages of Porphyry, Eusebius, Pliny, Quintus Curtius, Lucan, and, indeed, all the Latin writers. And although the Greeks entertained a somewhat different opinion, and ascribed the invention of letters to a younger Taaut, or Hermes, than the son of Misraim, and who flourished about four centuries afterwards, and was born in Egypt, as the first Taaut was born in Phœnicia, nothing is more evident than that the Greeks were less acquainted with the history of both Egypt and Phœnicia than the Romans, in consequence of the greater range of the Roman power; and that they confounded two personages of the same name, and who possessed the same crown, and attributed to the one what ought to have been attributed to the other. The oldest

Egyptian historian is Manetho, who probably drew up his dynasties about two centuries and a half before the Christian era; these only touch upon the subject indirectly, but, so far as they go, they rather support than oppose the testimony of Sanchoniatho.

There is some degree of doubt whether Greece derived its letters from Egypt or from Phœnicia: the best authorities, however, incline to the last opinion; and suppose them to have been introduced by the Phœnician Pelasgi, upon their settlement in Peloponnesus. The oldest Greek letters are nearly Pelasgic in form; and, according to the usual fashion in the East, are written from right to left. This last, however, is by no means a decisive argument; for upon the earliest use of letters, in most countries, there seems to have been no settled rule: and hence, in, perhaps, all of them, we meet with letters running from right to left, and from left to right; in many very ancient specimens of Greek running alternately, the one line in one direction, and the ensuing in the other, like the course taken by a plough, whence it was denominated, from this machine, the ploughing style; and in both Persia and Egypt, running perpendicularly like the common style of the Chinese, instead of horizontally whether to the right or the left.

That the Romans derived their alphabet from the Greeks is unquestionable: and hence, admitting the authority of Sanchoniatho, confirmed

as it is by a variety of collateral evidences, the first invention of writing seems to rest with the Phœnicians, and we are able to trace it to within one hundred and sixty years of the flood.*

I am purposely, however, using the term Phœnician in a very extensive sense; in that sense in which it appears to have been used by Herodotus, and the generality of ancient writers, in consequence of Phœnicia being the earliest and most extensive commercial nation; as embracing not merely the maritime coast of Palestine, of which Tyre and Sidon were the chief cities, but the whole country of the Canaanites and the Hebrews, under whatever name it may have passed at different periods, and from different circumstances; as Syria, Assyria, Syrophœnicia, Sidonia, Aram; and, of course, as touching upon, or rather crossing Mesopotamia, Babylonia, and Chaldea. And I hence obtain an answer to those, on the one hand, who contend that alphabetic characters had their origin in Syria; and to those, on the other, who assert the same in respect to Chaldea, persuading themselves, upon a tradition current among the Jews and Arabians, that Abraham introduced them into Egypt on his migrating from Ur of the Chaldees, at the command of the Almighty, seven generations after the period we have just been contemplating. The fact is, that all these countries spoke the same language, or,

* See Astle, pp. 45, 46. 64.

at the utmost, dialects of the same language, that in no instance differed farther from each other than the Scottish differs from the English; and all used the same alphabet, or alphabets that possessed as little variation: and hence there can be no doubt, that, in whatever part of this quarter of the globe the system of alphabetic characters originated, they were readily and rapidly introduced into every other part. Abraham might, hence, have learnt them in Chaldea, or in Canaan, and communicated them wherever he sojourned; as Ishmael, probably, communicated them shortly afterwards to Arabia, upon his exile from his father's house.

The proper Phœnician alphabet seems to have consisted of not more than thirteen letters at first; it afterwards had three added to it, making sixteen in the whole, and in this number it seems to have been earliest employed by many of the adjoining countries, and is distinguished by the name of the Samaritan, or ancient Hebrew, the terms and characters being nearly the same as the Phœnician. The Chaldeans introduced some kind of change into the form of the letters, made them more elegant, and added six other letters, since the Samaritan alphabet did not seem sufficiently full to express all the articulations of their speech. And in this manner, with various changes and augmentations, the Phœnician alphabet can be traced throughout every part of ancient and modern Europe; every region of Africa, where writing of any

kind is current, and the western countries of Asia.

Over a very extensive portion of this last continent, however, we meet with an alphabet that has no common origin or conformity of principle with any hitherto described. This is the Nagari, or Deva-nagari, as it is called by way of pre-eminence. It consists of not less than fifty letters, of which sixteen are vowels and thirty-four consonants, all arranged in the order of the alphabet, with a systematic precision that is to be found no where else. The vowels take the lead, beginning with those most easily uttered, and terminating with those which approach towards a consonant sound. The consonants then follow in five regular series of gutturals, compounds, palatines, dentals, and labials: the whole closing with letters expressive of sounds that do not exactly enter into any of the preceding series, and which may be regarded as forming a general appendix. This alphabet is asserted by many learned Bramins to be of a higher antiquity than any other; and there can be no doubt that it has a just claim to a very remote date. But its very perfection is a sufficient confutation of its having been invented first of all: something far more rude and incondite must have preceded and paved the way for it; and in the complex characters of which it consists, we seem to have the relics of that emblematic or picture-language, which I have thus endeavoured to prove

has laid a foundation for alphabetic writing in every part of the world. With a few trifling variations this correct and elegant alphabet extends from the Persian Gulph to China; but it has no pretensions to rival the antiquity of the Phœnician. It is unborrowed, but of later origin.

Such is a brief history of the noblest art that has ever been invented by the unassisted efforts of human understanding; an art that gives stability to thought, forms a cabinet for our ideas, and presents, in imperishable colours, a speaking portraiture of the soul. Without this, hard indeed would be the separation of friends; and the traveller would become an exile from his native home, — vainly languishing for the consolatory information that his wife, his children, his kinsmen, his country, were in a state of health and prosperity, and himself still embalmed in their affections. Without this, what to us would be the wisdom of past ages, or the history of former states? The chain of nature would be broken through all its links, and every generation become an isolated and individual world, equally cut off, as by an irremeable abyss, from its ancestors and from posterity. While the language of the lips is fleeting as the breath itself, and confined to a single spot as well as to a single moment, the language of the pen enjoys, in many instances, an adamantine existence, and will only perish amidst the ruins of the globe. Before its mighty touch time and

space become annihilated; it joins epoch to epoch, and pole to pole; it gives unity to the works of creation and Providence, and enables us to trace from the beginning of things to the end. It is the great sun of the moral world, that warms, and stimulates, and vivifies, and irradiates, and developes, and matures the best virtues of the heart, and the best faculties of the intellect. But for this, every thing would be doubt, and darkness, and death-shade; all knowledge would be traditionary, and all experience local; civilized life would relapse into barbarism, and man would have to run through his little, and comparatively insignificant, round of existence, the perpetual sport of ignorance and error, uninstructed by science, unregulated by laws, and unconsoled by Revelation. Have I not, then, justly characterized it as the noblest art that has ever been invented by the unassisted efforts of human understanding?

LECTURE XI.

ON THE LITERARY EDUCATION OF FORMER TIMES; AND ESPECIALLY THAT OF GREECE AND ROME.

We have taken a brief survey of the nature of oral language, and of the means devised in different ages and parts of the world to render the transitory ideas it communicates permanent, by means of picturesque or symbolical signs; so that what is once spoken may conveniently be copied or written down, and treasured up for future ages.

It yet remains for us to take some notice of the chief methods that have been adopted in different eras to turn this accumulating treasure or bank of intellectual knowledge to the best account; or, in other words, to develope the mode of education adopted amongst those nations that have been most celebrated for literary and scientific acquirements, especially in Greece and Rome; and to compare them with the means possessed in our own day, and the general and laudable desire of improvement manifested in every quarter, and prospective of no small addition to the best sort of wealth and prosperity with which a nation can ever be enriched.

We have already traced whatever degree of art or science may have descended from the antediluvian to the postdiluvian race, through

the narrow link of human beings preserved in the ark, or whatever the earliest generations of the postdiluvians may have been able to strike out for themselves, to the plains of Babylon as their centre; and observed that, in their radiations from this central point, they have been peculiarly influenced by the political character of the people who cultivated them, and that of the country and the climate in which they took up their abode.

When, in the prosecution of the present subject, we shall come hereafter to examine more particularly into the furniture and faculties with which the mind is endowed, we shall have to show that its chief trains, as well of feelings as of ideas, of passions and rational pursuits, have derived a strong tinge from these circumstances.

Of the birth or first growth of the Grecian states we know little or nothing, though we are made acquainted with the region from which they sprang. The exquisite beauty of the country in which they had the good fortune to fix themselves; its rich and picturesque variety of hill and dale, the spontaneous fertility of its soil, the sweetness of its temperature, the almost unbroken serenity of its skies, and the smooth and glassy sea that surrounded and deeply indented its coasts, harmonized all the ruder passions, and called forth the noblest and finest feelings of the soul. They soon became enamoured of the graceful and the beautiful; their language was melody, and they were led by na-

ture to delight in music, poetry, and painting, from the first. Hence these are the eldest employments we find them cultivating; the earliest historians were their rhapsodists, Homer, Hesiod, and the writers whose works constituted the very valuable Epic Cycle of Greece; a work, unhappily, long lost to the world, and from which Statius is supposed to have drawn the materials of his Thebaid *. Their earliest artists were their musicians; as Orpheus, and the priests of Cybele, and others of like power; the first of whom is represented not only as having harmonized the passions of men, but broken the ferocity of the beasts of the forests, and even tranquillized the tortures of the infernal regions. And of their early knowledge of colours and the art of designing we have a sufficient proof in various passages of the Cyclic poets that have reached us; while in Homer we have occasional references to their being applied, and by ladies, through the medium of tapestry, to the most important subjects of history. Thus Iris, in the third book of the Iliad, finds Helen occupied in representing in tapestry the evils which the Greeks and Trojans had suffered on her account in their battles; and when Andromache first heard the melancholy tidings of the death of Hector, she was engaged in a similar occupation. These, indeed, were employments of Trojan ladies, but what

* For the particulars of this celebrated work, see note in vol. ii. pp. 262, 263. of the author's Translation of Lucretius.

was common to them must have been common, also, to their neighbours of Greece.

Among the Greek states, however, that of Athens was by far the most renowned for its love of letters and science; and amidst the different eras which the Athenian history comprises, that of Pericles may be selected as affording the fairest specimen of the manner in which education was conducted, general learning and a knowledge of the arts acquired and disseminated, philosophy taught, and society cultivated and polished. This era may be regarded as contemporary with the reign of Artaxerxes the First of Persia, and Alexander the Second of Macedon, the rebuilding of the temple at Jerusalem under Nehemiah, and the establishment of the decemvirs at Rome: and, if we extend its range through an entire century, as, for example, from the middle of the fourth to the middle of the third century before the birth of our Saviour, it will just reach from Herodotus to Demosthenes, and will, besides these celebrated characters, include the existence of Euripides, Sophocles, and Aristophanes, among the poets; Thucydides, Xenophon, and Marsyas, among the historians; Lycias, Isæus, Isocrates, and Æschines, among the orators and rhetoricians; Socrates, Timæus Ocellus, Aristippus, Diogenes, Plato, Aristotle, and Epicurus, among the philosophers; Eudoxus, among the astronomers; and Apelles, among the painters.

The elementary branches of education were

acquired among the Athenians, as among ourselves, sometimes by private instruction, but more generally by public schools; many of which, at the period I am now adverting to, had attained a very high degree of reputation, and were crowded with youths from other Grecian states, and even from foreign countries. For the first five or six years, however, not the smallest effort was made to improve the mind; the whole of this period of time being devoted, agreeably to the advice of Plato, and even of many earlier sages, to sports and pastimes, for the purpose of giving strength to the body; exercises which were even afterwards continued with the greatest punctuality, under particular regulations, and constituted a very important branch of Athenian education. In this respect they seem to have imitated the example of the Persians, who never commenced training their children till they were five or six years old, not even those of royal birth. At the age of five or six, the rising generation of Persia were placed under the care of their magi, or men of letters, and combined a course of gymnastics with a course of moral science: the former consisted in learning to ride, to shoot with the bow, and to fight on horseback; the latter embraced and inculcated the valuable habits of honesty and speaking the truth, patience, sobriety, reverence to parents, and the practice of every other virtue. With them literature was subservient to morals.

The general circle of study among the Greeks

is well known to have comprised the seven liberal arts of grammar, rhetoric, logic, arithmetic, music, geometry, and astronomy. Of these the two first, or grammar and rhetoric, were commenced earliest, and occupied by far the greatest attention of the scholar: for poetry and declamation were now the most fashionable pursuits, and the Greek language was criticised with an accuracy amounting even to fastidiousness, for new niceties and turns of expression, both in prose and verse; the sense itself being often sacrificed to the sound as a matter of subordinate consideration. Nor was the time of the student allowed to be infringed upon by the acquisition of any other language; the vanity of the Greeks inducing them to regard almost all other nations as barbarians; and only a few of their philosophers thinking it worth while to make any sort of enquiry into the literature of remote countries.

Next to a critical initiation into their native language under the most celebrated grammarians, the chief object of Athenian education was, as I have just observed, to strengthen the body and give pliancy to the muscles by athletic exercises; for which purpose three magnificent establishments were instituted and supported at the public expence, consisting of an extensive range of buildings surrounding gardens that were defended by groves, porticoes, and shady walks, from the rays of the mid-day sun, and still further cooled and embellished by sheets of limpid water. These schools were called gym-

nasia, and comprised the Lycæum, the Cynosarges, and the Academy. Here the Athenian youth were instructed in the arts of wrestling, leaping, boxing, tennis, and foot-racing. In different parts of the buildings, large and commodious halls, duly provided with seats, were allotted to the philosophers, rhetoricians, and sophists; and in these halls the students were completed in the higher branches of instruction. At the age of eighteen the young Athenian had his name formally enrolled in the register of that division of the curia or militia of which his father was a member, and at twenty was admitted to all the rights and privileges of citizenship, and might plunge as soon as he chose into a contest for its honours and emoluments; or, if he were able, set up a magnificent establishment, and endeavour to distinguish himself at the chariot and horse-races.

The education of Athenian females was for the most part very limited. Those of the middle ranks of life were seldom taught any thing more than to read, write, sew, prepare wool for clothing, and superintend domestic concerns; whilst even the higher ranks, or those who were educated with more refinement, independently of this general knowledge, were only instructed how to take some part in the public festivals and other religious ceremonies of the country: such as that of carrying the sacred baskets on their heads, or of joining in the hymns and sacred dances. Upon this point, however, no

expence was deemed too costly, that could endow them with the requisite arts of modulating their voices and measuring their steps; no pains or sacrifice too extravagant that could bestow upon them elegance of shape and gracefulness of motion. Nor is this to be wondered at, since, excepting on such occasions, Athenian females, above the lower classes, seldom appeared abroad, and perhaps never without having their faces veiled. The married women, indeed, were allowed to receive and return visits among themselves, but even these were never permitted to be present at their husbands' parties, though the latter occasionally joined them at their own houses, and had the liberty of introducing their more intimate friends and companions. So that, among the female sex, none but those of acknowledged licentious manners had even an opportunity of becoming acquainted with the general literature, or literary characters, of their own times; whence, with a singular subversion of the very principles of their system of ethics, such persons were often noticed and even visited by philosophers and moralists.

Education, therefore, among the Athenians appears rather to have been directed to purposes of elegance and accomplishment than to the acquisition of useful knowledge. To possess the first dignities of the state; to be applauded in the assemblies of the people, or at the bar; to bear away the prize tripods at the palestræ, or public places for games of exercise among men,

as the gymnasia were for youths, or the prize-crowns at the theatre, were the chief objects of ambition among the more active. While the great body of citizens idled away almost the whole of their leisure hours by sauntering on the pleasant banks of the Ilissus, or in the agora, or great square of the city, frequenting every shop in succession, and especially those of the perfumers, in quest of news, for which they had an insatiable thirst; indulging their well-known vein of wit and keen satire upon passers and passing events, or listening to the declamations of sophists, and other noisy disputants.

A few clubs of wits are occasionally to be met with in the present epoch of the history of this people; and a few select assemblies for polite literature and elegant conversation: of which last the most remarkable, perhaps, was that held at the house of the celebrated Aspasia; since it was attended by Socrates and Alcibiades, as well as by almost every other scholar or philosopher of reputation, and by all the most renowned artists of the day. But we meet with no public establishment for a general course of science like that of the universities, or the Institutions (as they are called) of our own times, excepting their schools, nor with any public library of much note, except that of Pisistratus, which was carried away by Xerxes into Persia before the epoch, to which our attention is now directed, commenced.

Private libraries, however, were not uncom-

mon, though seldom extensive. Those of Aristotle, of Theophrastus, and of Euclid, the founder of the school of Megara, were perhaps the largest and most valuable. The art of printing being unknown, books were rare, and copied with great difficulty and expence; sometimes by individuals for their own benefit; but more generally by professional transcribers, who formed a distinct trade. The great mass of Athenians, moreover, though of exquisite taste and elegance, and certainly wealthier than most of the other Grecian states, seldom displayed those splendid fortunes which were so common in Persia. A freehold of the value of fifteen, or twenty talents, (about four or five thousand pounds sterling) raised a man considerably above the middle ranks of life. The father of Demosthenes was esteemed rich, the whole of whose property on his death amounted to not more than fourteen talents, or 3150*l.* sterling. Plato appears to have given a hundred minæ, or 375*l.* for three small treatises by Philolaus. * But this was a costly purchase: for Aristotle bought the whole library of Speusippus, small indeed, but select, for three talents, or 675*l.* †

Hence the trade of bookselling at Athens was generally upon a limited scale, and usually engaged in by persons of but little property, whose stock consisted mostly of books of mere

* Diog. Laert. in Plat. lib. iii. sec. 9. viii. 85.

† Diog. Laert. in Speus. lib. iv. sec. 5. Aul. Gell. iii. 17.

amusement; a part of which however was often sent to the adjacent countries, and sometimes as far as to the Greek colonies on the coast of the Euxine.*

In respect to books, and the possession of public libraries, Rome was far more fortunate than Athens; and I shall now hasten to a brief survey of its literary and scientific character in what may be regarded as its most classical and cultivated era; not the Augustan age, which has usually been contemplated as such, but that which immediately preceded it, reaching from the dictatorship of Sylla to the establishment of Augustus, and of course terminating a few years before the birth of our Saviour.

The Romans, who had hitherto devoted themselves altogether to arms and agriculture, and who had even despised eloquence, and paid no attention to the improvement of their native tongue, became attached to literature all of a sudden. The Achæans were accused by the Roman people of having acted hostilely towards them; and a thousand of them were sent as deputies, or rather as hostages, to plead their cause, and obtain the best terms they could for their country before the senate of this aspiring republic. Contrary, however, to the engagement stipulated with them, they were not allowed to enter upon their defence; were scattered

* Xenoph. Exped. Cyr. lib. vii. p. 412. Travels of Anacharsis, (Engl. vers.) iii. 130.

over different parts of the republic; forbidden to appear before the senate; and detained, in a state of captivity, for not less than seventeen years. For the most part these Achæans were men of taste and elegant accomplishments, and many of them were scholars of profound and diversified erudition. Such, more especially, was Polybius, who was soon introduced into public favour under the patronage of Scipio Æmilianus, and whose elegant Greek writings were now read and studied by every one. The whole republic became enamoured of the various acquisitions of its new, but mistreated visitants; and in matters of polite literature the conquerors soon yielded to the conquered. Hence schools for the study and exercise of rhetoric and eloquence, superintended by native Greeks, became in a short time so frequent, that scarcely a Roman youth was to be found who would engage in any other avocation; and the whole body of Greek philosophers and rhetoricians, that remained after the return of the Achæan deputies, were expelled by a decree of the senate during the consulship of Caius Fannius Strabo, and Valerius Messala, in the year of the city 592, in consequence of the ascendancy they had acquired over the public mind.

This expulsion, however, was too late; a general taste for Grecian literature had been caught, and the classical contagion had spread universally. Polybius was still studied, and the consul Rutilius Rufus had published, in elegant

Greek, a history of his own country. The Greek scholars, indeed, were still farther avenged a few years afterwards, by the general comparison which was drawn between their own genuine taste, and that of the tribe of Latin sophists and declaimers, who, in consequence of their banishment, had sprung up and occupied their place: men who were bloated with conceit, instead of being inspired by wisdom; and who substituted the mere tinsel of verbiage for the sterling gold of perspicuous argument and fair induction. With this foppery of learning the Roman government soon became far more disgusted than with the seductive talents of the Greek teachers; and hence, in the year of the city 661, during the censorship of Crassus, the Latin declaimers shared the fate of their predecessors, and were formally banished from Rome.

In their own language, therefore, we meet with but few successful specimens of prosaic eloquence down to this period: yet Cato the censor, Lælius and Scipio, were orators of no inconsiderable powers, and eminently, as well as deservedly esteemed, in their day. In poetry, however, the republic had already a right to boast of its productions; for Andronicus, Nævius and Ennius, had long delighted their countrymen with their dramatic as well as their epic labours: Pacuvius, and Accius, Plautus, Cæcilius, and Afranius had improved upon the models thus offered them in the former department, and

Terence had just carried it to its highest pitch of perfection. *

Public museums also, libraries, and collections of valuable curiosities of all kinds from Greece, Syracuse, Spain, and other parts of the world were, at this period, becoming frequent and fashionable. Italy was never more emptied of its elegancies and ornaments by Buonaparte, than Syracuse was by Marcellus, when stratagem and treachery at length gave him an admission into the city. In the forcible words of Livy, "he left nothing to the wretched inhabitants, but their walls and houses." Spain and Africa were in the same manner ransacked by the elder Scipio; Macedon and Lacedæmon by Flaminius; Carthage by Scipio Africanus; and Corinth, in the very same year, by Mummius. Nothing, however, can afford a stronger proof of the general want of taste for the fine arts among the Romans, even at this period, than the threat given by Mummius to the masters of the transports to whom he committed his invaluable pillage of the best pictures and statues of Achaia, that if they lost or injured any of them he would oblige them to find others at their own cost. In addition to which I may also observe, that Polybius, who was at this time with the Roman army, found a party of Roman legionaries, shortly after the capture of Corinth, playing at dice on the Bacchus of Aristides; a

* See the author's Life of Lucretius, prefixed to his translation of the poem De Rerum Naturâ.

picture so exquisitely finished as to be accounted one of the wonders of the world. Not knowing the value of it they were readily persuaded to part with it for a more convenient table; and when the spoils of Corinth were afterwards put up to sale, Attalus, king of Pergamus, a much better judge of painting than the Roman soldiers, offered for it six hundred thousand sesterces, or about five thousand pounds sterling. Mummius, the Roman consul and general, disbelieving that a picture of any kind could be so valuable of itself, thought it must contain some magical virtue in it; and hence would not allow it to be parted with, notwithstanding the remonstrances of Attalus. He did not, however, appropriate it to his own use, but placed it in the temple of Ceres, where Strabo informs us he had the pleasure of seeing it not long before it was consumed in the fire by which that temple was reduced to ashes. *

But the library and museum of most importance at this period, and which most attracted the attention of the Romans, was that established under the patronage and superintendence of the illustrious L. Æmilius Paulus; and consisted of an immense number of volumes, statues, and paintings, which he had imported from Epirus, upon the general plunder and destruction of that unfortunate country, in consequence of its adherence to Perses king of Macedon, and which had been accumulat-

* Strab. lib. viii. p. 381.

ing ever since the reign of Alexander the Great. This early and valuable collection was continually augmented by presents of other books from men of letters or warriors, into whose hands they occasionally fell as a part of the public spoil: but was more indebted to Lucullus, who had studied philosophy under Antiochus the Ascalonite, than to any one else; and who, about the middle of the seventh century of the city, added to it the whole of the royal library he had seized from Mithridates upon his conquest of Pontus.

Yet the transplantation into the Roman capital of the extensive and invaluable libraries of Aristotle and Theophrastus, contributed, perhaps, more than any other circumstance, to inflame the Roman people with a love of Grecian literature. This was effected by the conquests of Sylla, and anteceded the public present of Lucullus by about fifteen years. These unrivalled libraries were the property of Apellicon of Teia, who had accumulated an immense collection of books of intrinsic value at an incredible expence. Apellicon does not appear to have been, in any respect, a scholar: but he was a man of inordinate wealth; and, as it sometimes occurs in the present day, a library was his hobby-horse, and the greater part of his rental was expended in augmenting it. For this purpose he ransacked all the public and private collections of books in Asia: he surpassed, in many instances, the offers even of the kings Eumenes and Mithridates, for valuable volumes that had become scarce; and when

he was precluded from purchasing, he frequently induced the librarians, by considerable presents, to steal for him. During the first war, however, between Mithridates and the Roman republic, in which Sylla ultimately triumphed, and acquired a high degree of personal glory, Athens, in an evil hour, had united her fortunes with those of the Asiatic prince; and hence, at the conclusion of the war, was left totally at the mercy of the Roman conqueror. Sylla appears to have thrown a wishful eye upon every thing of value that lay within his reach: and having sacrilegiously invaded the groves of Academus and the Lyceum, the library of Apellicon was one of the next objects that captivated his attention. He was determined to add it to his other treasures. Force, however, was now become unnecessary: for at this very moment the book-worm Apellicon died, and he met with no resistance from his relations.

The Romans, by thus enriching themselves with the spoils of all the world, became possessed of an influx of wealth that enabled most of the citizens to gratify themselves, not only in this respect, but in almost every other that merely depended upon money. Of the wealth of various individuals, we may form some opinion by the following anecdote. Cæsar, by his unlimited liberality in furnishing shows to the people, had incurred a debt to an enormous amount; and when on the eve of setting out for Spain, the province that fell to him after his prætorship,

was abruptly stopped by his creditors. On this occasion Crassus stood forward as his surety, for more than two millions of our own money * (bis millies et quingenties), or, in exact English calculation, 2,018,229*l.* 3*s.* 4*d.* sterling.

But the literature of Greece was, nevertheless, best to be acquired in Greece itself; and the Romans, though they transplanted books, could not equally transplant the taste and spirit that produced them. Athens, although plundered of her richest ornaments, shorn of the glory of her original constitution, and dependent upon Rome for protection, had still to boast of her schools and her scholars. Every scene, every edifice, every conversation, was a living lecture of elegance and erudition. Here was the venerable grove in which Plato unfolded his sublime mysteries to enraptured multitudes; — here the awful Lyceum, in which Aristotle had anatomised the springs of human intellect and action; — here the porch of Zeno, still erect and stately as its founder; — and here the learned shades and winding walks of THE GARDEN of Epicurus, in which he delineated the origin and nature of things, and inculcated tranquillity and temperance. Here Homer had sung, and Apelles painted; here Sophocles had drawn tears of tenderness, and Demosthenes fired the soul to deeds of heroism and patriotic revenge. The monuments of every thing great or

* Stewart's Life of Sallust, i. p. 135; Plut. in Jul. Cæs. p. 712, ed. Francof. Suet. in Jul. Cæs. xviii.

glorious, dignified or refined, wise or virtuous, were still existing at Athens; and she had still philosophers to boast of, who were worthy of her fairest days, of her most resplendent reputation. *

To this celebrated city, therefore, this theatre of universal learning, the Roman youth of all the first families were sent for education. And at the period we are now contemplating, we meet with the following names, as co-students, and chiefly attendants upon the Epicurean school, forming a most extraordinary concentration of juvenile talents and genius: Tully, and his two brothers Lucius and Quintus, the last of whom was afterwards a poet, and as signally distinguished in the profession of arms, as the first was in that of eloquence; Titus Pomponius, from his critical knowledge of the Greek tongue surnamed *Atticus*, but who derives this higher praise from Cornelius Nepos, that "he never deviated from the truth, nor would associate with any one who had done so;" Lucretius, author of the well-known poem on the Nature of Things; Caius Memmius, the bosom friend of Lucretius, of whose talents and learning the writings of Tully offer abundant proofs, and to whom Lucretius dedicated his poem; Lucretius Vespilio, whom Cicero has enumerated among the orators of his day; Marcus Junius Brutus, Caius Cassius, and Caius Velleius, each of whom immortalized him-

* See the author's Life of Lucretius, prefixed to his Translation of the Nature of Things, p. xxix.

self by preferring the freedom of his country to the friendship of Cæsar. And when to these I add the names of the following contemporaries, most of whom, we have reason to believe, were also co-students at Athens with those just enumerated — Julius Cæsar himself, Crassus, Sulpitius, Calvus, Varro, Catullus, Sallust, Hortensius, Calpurnius, Piso, Marcus, Marcellus, whose son Caius married Octavia, the sister of Augustus, Atheius, and Asinius Pollio, to whom Virgil dedicated his fourth eclogue, and who founded, expressly for the use of his country, one of the most splendid and extensive libraries the republic was ever possessed of, collected from the spoils of all the enemies he had at any time subdued, and still further enriched by him at a vast expence, — we meet with a galaxy of talents and learning, which neither the Augustan nor any other age in the whole history of the Roman republic can presume to rival.

It was the son of Octavia whose ripening virtues and untimely death Virgil is so well known to have referred to in the pathetic tribute introduced into the vision of Æneas :

> Heu miserande puer! si quâ fata aspera rumpas,
> Tu Marcellus eris. *
>
> Ah! couldst thou break, lov'd youth! thro' fate's decree,
> A new Marcellus should arise in thee.

This accomplished youth, the delight of the Roman people, appears to have been well en-

* Æneid. vi. 881.

titled to so high a compliment. It was the intention of his uncle Augustus that he should succeed him, and Virgil received from Octavia, for the verses that related to Marcellus, a pecuniary present of the value of 2500*l.*

Cicero acted wisely, therefore, in sending, as he expressly declares he did, all his young friends to Greece, who evinced a love for study, "that they might drink from fountains rather than from rivulets." "Meos amicos, in quibus est studium, in Græciam mitto: id est ad Græciam ire jubeo: ut ea à fontibus potius hauriant, quàm rivulos consectentur." *

Horace alludes to the same seat of learning, and nearly the same habit of studying there in his own case, by way of finishing his education, after having read Homer at home:

Romæ nutriri mihi contigit, atque doceri,
Iratus Grajis quantum nocuisset Achilles.
Adjicere bonæ paulò plus artis Athenæ:
Scilicet ut possem curvo dignoscere rectum,
Atque inter silvas Academi quærere verum.†

At Rome I first was bred, and early taught
What woes to Greece Achilles' anger wrought.
Famed Athens added some increase of skill
In the great art of knowing good from ill;
And led me, yet an inexperienced youth,
To academic groves in search of truth.

BOSCAWEN.

Nor were other branches of science, or even the extensive circle of arts and manufactures

* Acad. Quest. i. 2. † Epist. Lib. II. ii. 41.

forgotten in the midst of the fashionable study of philosophy and literature, either at Rome or in the Greek states. We have not time to enter into a survey of the very extensive, and, in various respects, accurate views that were taken of many of the most important pursuits of our own day, and the activity with which they were followed up. In statuary and architecture, as well as in poetry and eloquence, the models of ancient Rome, as well as of ancient Greece, are still the models of our own times. We have already touched upon the skill of the Greek masters in the art of designing; which they practised with great perfection in every diversity, from simple outline or linear drawing, to every variety of silhouette, or light and shadow, as well as every kind of painting with colours; while in one or two varieties they went far beyond our own day, as in encaustic painting, both on wax and on ivory; a branch of the art, which has, unfortunately, been lost for ages, yet the most valuable of all, as being the most durable. Their acquirements are truely astonishing in almost every ramification of invention or execution that the mind can follow up; and the progress which we have still proofs of their having exhibited in metallurgy, crystallography, mirrors, mineralogy, chemistry, mechanics, navigation, optics and catoptrics, weaving, dyeing, pottery, and a multiplicity of other manufacturing or handicraft trades, must appear incredible to those who have not deeply entered into the subject. Their splendid

purple cloths — Babylonica magnifico colore, — have, perhaps, never been equalled since; the immense and fearful machinery invented by Archimedes, at Syracuse, for laying hold of the largest and most formidable Roman gallies with its ponderous and gigantic arms, and whirling them with instantaneous destruction into the air, as they approached the walls of this famous city during its siege; — the burning-glasses contrived by him for setting them on fire at a distance, by a concentration of the sun's heat alone; — their knowledge of the existence and fall of meteoric stones — not many years ago laughed at as a chimera among ourselves; — and the adumbration, to call it by no stricter term, with which the grand principles of the Copernican system of the heavens was approached by Nicetas, Philolaus, Aristarchus, and other disciples of the Copernican school — are, I trust, sufficient proofs of the truth of this remark, though hundreds of other examples might be added to the list. *

Still, however, the observation I have made with respect to the education and study of the Athenians, applies with considerable, though not altogether with equal force, to those of the the Romans. Elegance and accomplishment

* On a former occasion the author had an opportunity of following up and developing this interesting subject at considerable length; and those who are desirous of pursuing it with him, may turn to the running commentary to his Translation of Lucretius, vol. i. p. 338. 414; vol. ii. p. 50. 131. 135. 154. 159. 401. 491. 568.

seem rather to have been the chief objects of attainment than deep physical and analytical science. Polite literature and statistics were almost swallowed up in the vortex of natural philosophy; and logic, or rather dialectics, usurped the place of induction. Rome, moreover, like Athens, does not appear to have been possessed of any public establishment for a general course of science, similar either to the universities or the Institutions of the present day.

There are various writers who have endeavoured to draw up lists of Greek and Roman names, from the books that have descended to us of persons who were celebrated, in their respective eras, in different branches of the arts and sciences. Among the most complete of these are the tables of the Baron de Sainte Croix, of the Academy of Belles Lettres: and as nothing can give us a clearer idea of the prevailing taste and inclination of a people, than a comparison of the numbers of those engaged in one department with those engaged in others, I have taken some pains to form, from these tables, an estimate to this effect. The tables extend through nearly the whole range of Grecian history, (though they are confined to that history), from the uncertain times of Orpheus and Cadmus to that of Euclid; or, in other words, from the commencement of the twelfth or thirteenth, to the close of the third century, before the Christian era.

They contain the names of 863 persons, as

artists or men of literature: and upon arranging them into their different classes, I find the relative proportion as follows:

Legislators and Philosophers	152
Orators, Rhetoricians, and Sophists	54
Grammarians, Editors of earlier works, and Critics	13
Astronomers, Mathematicians, and Geometers	38
Physicians	28
Zoologists, and Agricultural Writers	12
Geographers and Navigators	17
Mechanics	9
Founders and Metallurgists	6
Engravers	7
Architects	32
Statuaries and Sculptors	95
Poets, Painters, and Musicians	400
	863

Hence it appears, that far more persons were engaged in the two last classes, or those of poetry, music, and painting, and of statuary and sculpture, than in all the other classes collectively; that next to these, the legislators and philosophers were most numerous, and then the orators, rhetoricians, and sophists; that, but little comparative attention was paid to natural history and agriculture, and still less to mechanics; and that not a single name has reached us in the departments of mineralogy, statics, hydrostatics, trades, and manufactures; to say nothing of chemistry and pneumatics, which may principally be regarded as sciences of modern times.

That several of these latter departments were studied to a certain extent is unquestionable; but it is also equally unquestionable that that extent must have been very limited, since otherwise the names of those who had studied or cultivated them must have descended to the present day in some of the writings that have reached us.

This comparative view of the arts and sciences of Greece may, with little variation, be applied to those of Rome. The study of the fine arts, however, was here less extensive; and the race of orators and political demagogues, in consequence of the peculiar character of the government and of the people, more numerous. Natural history and agriculture, moreover, appear to have made more progress, and various branches of trade and manufacture to have been cultivated with more success.

Upon the whole, however, Rome added but little to what she derived from Greece: nor has much been added in any subsequent era, or by any nation amidst which the variable fortunes of science and literature have compelled them to take shelter, till within the course of the last two centuries; towards the beginning of which period Lord Bacon observed, with not more severity than correctness, that "the sciences which we profess have flowed almost entirely from the Greeks; for those which the Roman or Arabian, or still later writers, have added, are but few, and these few of but little moment; and, whatever

they may be, are built upon the foundation of what the Greeks invented; so that the judgment, or rather the prophecy of the Egyptian priest, concerning the Greeks, is by no means inapplicable, 'that they should always continue boys, nor possess either the antiquity of science, nor the science of antiquity.'"*

It remained for this extraordinary character, who thus fairly estimated in his own day the value of ancient and modern learning, to break through the spell which fatally pressed upon it, and seemed to prohibit all further progress. It is to Bacon, and almost to Bacon alone, that we are indebted, if not for the scientific discoveries that have enriched the last two centuries, and struck home to every man's business and bosom, at least for that mode of generalizing the laws of nature, and of connecting the various branches of the different arts and sciences, which have chiefly contributed to those discoveries; which have called mankind from the study of words to the study of things, and have established from the book of nature the truth of that maxim, which had hitherto only loosely floated in the books of the poets, that

All are but parts of one stupendous whole.

It was my intention, in proof of this assertion, to have taken a brief survey, even before we closed the present lecture, of the shifting scenes

* Nov. Org.

of science and literature from the decline of the Roman empire to their re-establishment in the fifteenth and sixteenth centuries; to have given a glance at them in their retreat amidst the eastern and western caliphats, in what have usually been called the dark ages of the world, extending from the fifth, but especially from the seventh to the fifteenth century; to have contemplated them on their re-appearance and first spread, their resurrection and restoration to life and action, under the fostering providence of the illustrious houses of Medici, Urbino, Gonzaga, and Este; from which last, the most ancient and most distinguished of the whole, our own royal family derive their descent; to have surveyed them as basking under the patronage of Leo X; but especially as they were affected by the wonderful and all-controlling influence of the Reformation which occurred during his papacy; and to have compared the character they then assumed, with that which they exhibit in our own day;—but, interesting as the subject is, I am compelled by want of time to postpone it till our next lecture, when I shall return to the subject, and carry it forward as the period will allow.

I shall only further observe, that, on the first reviviscence of literature, it was chiefly limited to classical and philosophical subjects, and confined to the courts of princes, or the walls of universities, which were now establishing in almost every state of Europe: the classical or ornamental branches being mostly cultivated in

the courts, and the speculative or philosophical in the schools. And such, with little variation, continued to be the course of learning, till the appearance of that great luminary in the hemisphere of letters to whom I have just adverted. No sooner, however, had the writings of Bacon, and of other characters of a similar comprehensiveness of mind, who co-operated in his views, become diffused, than institutions of another class were found wanting: — a something that might fill up the space between the cloistered scholar and the irrecondite citizen; the dry principles of speculative science, and the living practice of the artist and the mechanic. And hence, academies and societies for natural knowledge became organized and incorporated — museums were founded — taste, ingenuity, and invention commenced a happy intercourse — the general results of their communications were, for the most part, periodically published, and the great mass of mankind became more generally enlightened than in any former period of the world.

But a mode of acquiring a familiar and systematic initiation into the general circle of the arts and sciences, was still felt desirable for the body of the people; a sort of rudimental education, by which they might be able to assist and appropriate the knowledge that was flowing around them in every direction; that might call forth their own energies and resources, and reflect with increased lustre the light in which they were

walking. And hence have arisen these scientific schools which are now commonly known by the name of Institutions; and especially, if I mistake not, the school I have the honour of addressing.

An establishment of this kind, to be perfect, should be possessed of a library adequate to every enquiry — a laboratory and a museum of equal extent, and a course of instruction commensurate with the whole circle of the sciences. Such an establishment, however, is not to be expected; and especially in our own country, where the government is seldom solicited for assistance, and the sole endowment results from the joint patronage and contribution of individuals. All that remains for us, therefore, is to make the best use of the the means that are in our power, and to carry them to the utmost extent they will reach; and I can honestly congratulate the members of the Institution before me, with having, in this respect, conscientiously acted up to the fullest limits of their duty, and of having rather set an example than followed one; for it is a matter of notoriety to the world at large, that there is no other Institution in which the same measure of income has been extended to the same measure of acquiring knowledge, whether by books or by lectures.

LECTURE XII.

ON THE MIDDLE OR DARK AGES.

If we examine the history of Europe in a literary point of view, we shall find it consist of three distinct periods — an era of light, of darkness, and of light restored. To the first of these periods I directed your attention in the preceding lecture. We noticed the general state of literature and the mode of education adopted in Greece and Rome, at the most splendid epochs of these celebrated republics, and briefly compared them with the means of acquiring knowledge in our own day; and we at the same time glanced rapidly at the intervening space, or middle period; or rather only touched upon a few of its leading features, from an impossibility of compressing even a miniature sketch of its history into the limits of a single lecture; though it may be remembered that I threw out a pledge of returning to the subject on the present occasion, and of investigating it in a more regular detail.

A part of that pledge I shall now, by your permission, endeavour to redeem; by taking a survey of the general literature, or ignorance of mankind, which characterized that wonderful

era which has usually been described by the name of the DARK, or MIDDLE AGES; and which extends from the fall of Rome before the barbarous arms of the Goths, in the fifth century to the fall of Constantinople before the equally barbarous arms of the Turks, in the fifteenth century; thus comprising a long, afflictive night of not less than a thousand years; yet occasionally illuminated by stars of the first magnitude and splendour: and big with the important events of the sack of Alexandria and the destruction of its library; the triumph and establishment of the Saracens, and their expulsion from Spain; the devastation of Europe, and the overthrow of its ancient governments in favour of the feudal system, by successive currents of barbarians from the north-west of Asia, pouring down under the various names of Alans, Huns, Ostrogoths, and Visi-goths, or eastern and western Goths; sometimes in separate tides, and sometimes in one united and overflowing flood; the deliriums of chivalry, of romance, and crusading; the introduction of duels and ordeals; of monkery and the inquisition; the separation of the eastern from the western church; and the first gleams of the Reformation, under the fearless and inflexible Wyckliff. And, in our own country, the descent of Hengist on the isle of Thanet; the establishment of the Saxon octarchy; the general sovereignty of Egbert; the glorious and golden reign of Alfred; the conquest of the Norman invader; the bloody feuds of the houses

of York and Lancaster; and their termination, on the union of the two families, after the memorable battle of Bosworth.

This will lead us to the fair epoch of the revival of letters under the patronage of Leo X., and the still more commanding influence of the Reformation; a period, however, upon which it will be impossible for us to touch in the course of the present enquiry, though I shall still bear it in memory, and request your attention to it on a subsequent opportunity.

The literary taste and pursuits of Rome continued nearly the same under her emperors as during her republican form of government. Athens was still the alma mater of the higher ranks of her youth; and, as she increased in opulence and in luxury, she resigned herself more fully to those Grecian blandishments which were despised under the commonwealth.

On the death of Constantius, which took place in our own city of York, in the year of our Lord 306, for even Britain had at this time bowed down, through a large extent of her territory, before the mistress of the world; Constantine, his favourite son, was, agreeably to his father's will, proclaimed emperor in his stead. Galerius, however, who was co-emperor with Constantius, opposed this regulation, and endeavoured to secure the whole of the empire to himself; while various other chieftains taking advantage of the public confusion, not less than four competitors assumed the imperial purple at

the same time. It was the good fortune of Constantine to triumph over all his rivals; and having at length securely seated himself on a throne whose dominion extended over almost the whole of Europe, and a considerable part of Asia and Africa, he resolved upon building a new imperial city, more immediately in the centre of his dominions; and for this purpose chose the spot of the ancient Byzantium, than which the whole globe could not offer a more auspicious situation, whether in regard to climate, commercial intercourse, or defence. The walls of Byzantium rose on the Thracian coast of the Propontis, or modern Sea of Marmora; secured by the key of the Thracian Bosphorus on the left, which gave an entrance to the Euxine, and the whole interior of the north; and by the key of the Hellespont, or Dardanelles, as it is now called, on the right, directly opening into the Archipelago, and communicating with every other part of the world; the whole of civilized Europe lying immediately behind, and Asia and Africa immediately in front; surrounded by all those scenes which had been richest in harvests of Grecian glory, and had chiefly contributed to immortalize the Grecian name. The language was Greek, the country was Greek, and the customs and manners still possessed that mildness and suavity which so peculiarly characterized this polished people; and which, in no inconsiderable degree, have descended to the present hour. The city, thus

erected, the Roman emperor called after his own name, Constantinople; he removed the court to it from the old metropolis, and by the enormous sums he expended upon it, and the encouragement and patronage he lavished upon settlers of every kind, and especially upon men of letters and artists, he beheld it, in a few years, rivalling the magnificence, and even the extent of Rome itself. He endowed it with the same rights, immunities, and privileges; and established an equal senate, equal magistracies, and other authorities, and declared it to be the metropolis of the East, as Rome was that of the West. Constantinople is also worthy of attention on another account, as being the first city in the world that was dedicated by the authority of the government to the service of the Christian religion.

The fact of Constantine's conversion is too important, and the means by which it was accomplished too singular to be passed by on the present occasion; and that I may not be suspected of exaggeration or undue embellishment, I shall give it you in the plain, unvarnished words, of the very cautious and authentic writers of the Ancient Universal History.

In describing the war in which Constantine was involved with Maxentius, his most powerful competitor for the empire, they thus observe, at the same time giving their authorities, as they proceed, with an indefatigable research, and weighing them with a scrupulous circumspection which has rarely been equalled in later times:

"In this war Providence had something in view, infinitely more important than the rescuing of Rome from the tyranny of Maxentius; nothing less than the delivering of the church from the cruel persecution under which it had groaned for the space of near three hundred years. Constantine had inherited of his father some love and esteem for the Christians; for the first use he made of his authority, was to put a stop to the persecution in the provinces subject to him. However, he had not yet shown any inclination to embrace a religion which he both honoured and esteemed; but in the war with Maxentius, apprehending that he stood in need of an extraordinary assistance from heaven, he began seriously to consider with himself what deity he should implore as his guardian and protector. He revolved in his mind the fallacious answers given by the oracles to other princes, and the success that had attended his father Constantius in all his wars, who despised the many gods worshipped by the Romans, and acknowledged only one Supreme Being. At the same time he observed, that such of his predecessors as had persecuted the Christians, the adorers of this God, had miscarried in most of their undertakings, and perished by an unfortunate, and untimely end; whereas his father, who countenanced and protected them, had, in all his wars, been attended with uncommon success, and ended his life in the arms of his children.

"Upon these considerations he resolved to have recourse to the God of his Father, and adhere to him alone. To him, therefore, he addressed himself with great humility and fervour, beseeching him to make himself known to him, and to assist him in his present expedition. Heaven heard his prayer in a manner altogether miraculous; which, however incredible it may appear to some, Eusebius assures us he received from the emperor's own mouth, who solemnly confirmed the truth of it with his oath. As he was marching at the head of his troops in the open fields, there suddenly appeared to him AND THE WHOLE ARMY, a little after mid-day, a pillar of light above the sun, in the form of a cross, with this inscription:

"CONQUER BY THIS." *

The emperor was in great pain about the meaning of this wonderful vision till the following night; when our Saviour appearing to him, with the same sign that he had seen in the heavens, commanded him to cause such another to be framed, and to make use of it in conquering his enemies. The next morning Constantine imparted to his friends what he had seen; and sending for the ablest artificers and workmen, ordered them to frame a cross of gold, and precious stones, according to the directions which he gave them. Constantine being after the miraculous vision, immutably determined to

* Τούτῳ νίκα.

adore that God alone who had appeared to him, sent for several bishops in order to be instructed by them in the mysteries of their religion, and in several particulars of the late apparition. He hearkened to them with the utmost respect, and believed what they told him of the divinity, incarnation, cross, and death of our Saviour, reading with great attention the Holy Scriptures, and consulting in his doubts the bishops whom, for that purpose, he kept constantly about him *."

* Rom. Hist. b. iii. ch. xxv. vol. xv. p. 554. 8vo. ed. 1747. The account is taken from Eusebius; and by some writers, who find it easier to ridicule than to weigh testimony, it has been called a pious fiction; but with what justice, the following remarks will sufficiently show. First, Constantine and Eusebius are allowed by all parties to have been men of general honesty and intelligence, to give them no higher character. Secondly, Constantine declares that the vision of the cross and of the pillar of light, were beheld by the whole army as well as by himself. Thirdly, Eusebius affirms that he gave an account of the whole to the artists for whom he immediately sent, on the morning after his explanatory dream, to construct a standard ornamented with a copy of the golden cross he had beheld and enriched with jewels, according to the direction he gave them. Fourthly, he tells us that Constantine narrated the same statement to the bishops, whom he had assembled to give him spiritual advice on the occasion. And, fifthly, that he afterwards gave the whole history of it, in like manner, in his own person, to Eusebius himself; and confirmed the narration with an oath.

All this may, indeed, be said to be nothing more than the declaration of Eusebius alone; but when we add to these remarks, sixthly, that Eusebius published his account in the

This extraordinary event having preceded his determination to build a new metropolis, he expressly dedicated the city, as I have already observed, when on the point of being completed, to the service of the religion he had so lately embraced: solemnly consecrating it, in conformity with the custom of the times, to the Virgin Mary, according to Cedrenus, but according to Eusebius, to the God of Martyrs.

Upon his death-bed Constantine divided the empire into five parts; his three sons and two of his nephews being allowed to share the imperial domains between them. The building of Constantinople was a severe blow to the splendour and opulence of Rome; and this

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general face of those to whom he asserts that the emperor communicated it at the time, and in the face of hundreds, perhaps of thousands of the army, who he also asserts beheld the glorious vision, the cross and its motto, as well as the emperor; and that not an individual ventured to step forward and contradict him: and when, lastly, we take into consideration the undisputed fact, that the figure of the cross pourtrayed in the pillar of light, was copied, together with its motto, and placed on every banner of the imperial army from this time forth; and that all the branches of the imperial family became converts to Christianity from the same period; — when all these points are taken into consideration, a case is made out, not only that sufficiently vindicates the veracity of Eusebius, but that probably demands a more miraculous power to shut the heart against its admission, than that of the miracle which is its subject-matter. — See Euseb. Vit. Const. lib. i. cap. xxvii—xxxi. p. 421—423.

partition of the imperial authority was an equal blow to the extent and integrity of the empire at large. The tributary nations of every quarter, as soon as they found that the consolidated force of the empire was thus frittered away, were in arms, with a view of regaining their liberty or of enlarging their boundaries. The Franks and other German tribes broke into Gaul; the Sarmatians into Pannonia, or what is now called Hungary; the Picts, Scots, and Saxons, into Britain; and the Asturians into Africa.

To oppose this general ravage, the imperial dominions were once more consolidated, and not long afterwards, in the reign of Valentinian, who admitted his brother Valens to an equal participation in the purple with himself, regularly divided into two distinct empires, under the names of the Eastern, or Greek, and the Western, or Latin empire; the former comprehending Illyrium and Pannonia, or Sclavonia and Hungary as they are now denominated, Thrace, Macedon, Greece, Asia Minor, Egypt, Syria, Palestine, and all the eastern provinces, having Constantinople for its metropolis; and the latter embracing Gaul, Italy, Africa, Spain and Britain, its metropolis being ancient Rome.

The greater degree of energy manifested by the successors to the eastern empire preserved its boundaries for a considerable period of time free from much mutilation; but the empire of the west, in which Rome, though once more encouraged

by the presence and patronage of a splendid court, was never able to recover from the blow it had received by the building of Constantinople, continued to droop from its first establishment. Its successes were few and trivial, and such as rather tended to invite new hordes of barbarians into the heart of its fairest provinces than to deter from aggression by examples of signal vengeance and severity.

The tide of incursion, as I have already observed, flowed almost entirely from the north. Beyond the Tanais, and immediately crossing the Imaus or Caf of the Caucasus, extending nearly from the banks of this river to the sea of Japan, lay scattered, at the commencement of the Christian era, a variety of tribes unknown to the conquering sword of the Roman legions, and distinguished by the names of Vandals, Sueves, Alans, Goths, Huns, Turks, and Tartars. Of all these the Huns appear to have given the earliest proofs of restlessness and love of power: they first pressed forward upon the Goths, who, dispossessed of their native regions, bore down upon the Vandals, Sueves, and Alans; and these, flying before them, entered into Gaul, and from Gaul advanced into Spain; and on being driven from Spain passed over and invaded Africa; thus making way for a farther advance of the Goths and Huns into the centre of the western empire, which they prosecuted sometimes in conjunction and sometimes alone. Hence, even Italy was in several instances over-run, and Rome itself taken

and sacked by the Goths under Alaric, towards the beginning of the fifth century; while the Goths themselves were in their turn, about forty years afterwards, obliged to fly before the victorious arms of Attila, the Hunnish leader, or to enlist under his banners; a barbarous chieftain, who, descending from the wild and barren mountains of Scythia, spread terror and devastation over almost the whole of Europe; and, possessing a political authority of as extensive a range towards the east, proved a formidable enemy to every sovereign from China to Gaul. The camp of this adventurous and successful soldier, when he was stationary, was pitched on the northern side of the Danube, between the Teiss and the Carpathian mountains; his court was unrivalled in splendour and magnificence, and his empire extended through a range of not less than seven thousand miles in length. On the death of Attila, this enormous, but ephemeral empire, which had only "grown with his growth and strengthened with his strength," insensibly crumbled away. "The Huns were melted down into the nations which they conquered; and, if the modern Hungarians be excepted, whose descent from them is rather a plausible conjecture than an historical fact supported by conclusive evidence, few vestiges of them are now discoverable either in Europe or Asia." *

* Butler, Hor. Bibl. part ii. p. 85.

The history of the Roman empire from this period may be comprised in a few words. Towards the close of the fifth century, during the reign of Augustulus, who had regained possession of the central provinces, it was overthrown by the Herulians under Odoacer, who were themselves shortly afterwards expelled from Italy by Theodoric, king of the Ostrogoths. About the year 568 the Lombards, issuing from the mark of Brandenburg, invaded the Higher Italy, as it was named, and founded a powerful state, called the empire of the Lombards; the Middle and Lower Italy being added to the empire of the east by the brilliant conquests of Justinian's celebrated, but ill-requited generals, Belisarius and Narses. These, however, were afterwards wrenched from it and incorporated into the new empire of the Lombards; from whom the whole passed, together with almost the entire amplitude of polished Europe, into the hands of Charlemagne, the second sovereign of the second dynasty of the Franks; a people that, having subdued all Gaul, had established themselves in that country for about three centuries already; and had, through the greater part of that period, professed the Christian religion. Charlemagne entered Rome in triumph, and was crowned emperor of the Romans, with great pomp and festivity, towards the close of the eighth century.

While such was the series of misfortunes that attended, and at length totally subverted the

western empire, that of the east had to strive with difficulties of another kind, and which produced a still greater change in the political aspect of the world.

The nations by whom the successive conquests of Europe had been effected, proceeded, as we have already beheld, from different, though contiguous tracts of country, spoke different languages, and were under the command of different leaders. Yet, having originated from a like cradle, from the solitude of mountain-fastnesses, and the savage wild of precipitous scenery, nursed in the midst of snows and howling tempests, they appear to have established, in almost every state which they subdued, nearly the same legislative system; a system known by the name of the Feudal Law, and the introduction of which into Europe constitutes one of the most prominent features of European history.

It was about the middle of the period we have thus far contemplated, in the year of our Lord 568, that Mahomet was born in Arabia: and a period more auspicious to his unrivalled craft and overtowering ambition could not possibly have been produced by any concurrence of circumstances. The barbarians of the north had just completed their conquest over regular monarchy; the western empire was tottering to its foundation, while the eastern was shorn of its limits and weakened by internal oppressions. Yet neither the extent of the territories of the barbarian powers, nor their respective forms of

government, were definitively settled; while, at the same time, the fury which had accompanied their progress being exhausted, they had sunk into a state of political lethargy, and no bond of union or co-operation existed between them. Were we to search for that period of the Christian era in which there was least of order, least of power, least of science, and least of intercourse in Europe, we should be compelled to pitch upon the century which immediately preceded, and that which immediately followed the commencement of the Hegira.

Mahomet flourished in the middle of this period. Deriving his immediate descent from the patriarch Abraham, through the line of Ismael, and, perhaps, eldest son of eldest son, from the commencement of the chain, he was a man of unbounded ambition, most enterprising courage, insinuating address, and instructed in all the science of his day. He beheld his own country without any fixed principles of religion, and ignorantly intermixing the rites of Judaism with the doctrines of Christianity; he beheld the professors of the Christian church engaged in perpetual disputes upon inexplicable mysteries; and excommunicating and massacreing each other, as they alternately possessed the power, upon a mere difference of recondite, or speculative points. It was the precise moment for the invention of a new creed, and he invented one accordingly. With a mastery of craft that has never been equalled, even in our

own eventful age, he infused into the heterogeneous mass a charm adapted to captivate every party and every passion; and, to destroy every doubt of success, he united the power of the sword to that of the new faith, and threw open the gates of Paradise, and all the enjoyments of the beatified, to every soldier who should fall under the banners of the crescent.

Such a religion, launched forth at such a period, and aided by such auxiliaries, it was impossible to oppose by human means. It ran like lightning over the whole of Arabia, and equally subdued before it political friends and political foes. The states of Barbary were compelled to embrace it; the leaders of the Turks, the Mongol Tartars, and the Persians, found it admirably adapted to their purpose, and embraced it voluntarily; all the Asiatic provinces of the eastern empire were overrun by the armies of the prophet himself, or his descendants, Abubeker and Omar: who, on succeeding to Mahomet, assumed, from respect and in reference to him, the subordinate title of Caliph, or Vicar. All Syria was invaded by the former for the express purpose, as he openly asserted, "of taking it out of the hands of the infidels;" and Jerusalem itself was captured by the latter, and rendered, shortly afterwards, one of the principal bulwarks of the Saracens, as they were soon denominated among the Christian powers.

The doctrine fundamentally inculcated by the Saracen chiefs, was, that "to fight for the faith is

an act of obedience to God;" and on this account they characterized their ferocious and bloody ravages by the name of *holy wars*. And having been the first to adopt this absurd and contradictory term, they laid down a model, and offered at least an apology for the crusades. And such was the success of their enterprise, that in less than a century from the commencement of the Hegira, they spread the religion of Mahomet from the Atlantic Ocean to India and Tartary, and obtained the whole, or the greater part of the temporal, as well as the spiritual power in Syria, Persia, Egypt, Africa, and Spain. Spain, indeed, has since been rescued from their bondage; but the same general success continuing, the whole of the eastern empire was overturned, and Constantinople itself taken possession of in 1453; whilst, in different directions, they have also pursued the same triumphant career over the kingdoms of Visapour and Golconda, in India; the islands of Cyprus, of Rhodes, and the Cyclades; and have made large territorial acquisitions in Tartary, Hungary, and Greece.

Such is a brief, but afflictive sketch of the history of the world, during what has been appropriately denominated its dark ages, throughout which it may correctly be said, that

> No light, but rather darkness visible,
> Serv'd only to discover scenes of woe,
> Regions of horror, doleful shades.

In effect, every thing concurred to introduce and establish an universal reign of ignorance and gloom: and I shall next proceed to notice more particularly a few of those causes which chiefly co-operated in producing so calamitous a result.

And the first that occurs in the course of the survey, is the sinister and contracted views, and the general repugnance to all science and polite learning that so strikingly distinguished that particular set of the barbarous tribes of the north, already noticed, by whom Europe was earliest overrun; all of whom, by a generic term, may be denominated Scandinavians. Judging of these from the only Scandinavian records which have descended to our own times, the fabulous fragments collected by Sæmond and Snorro, and which are respectively called Eddas, all their arts and inventions were rude, and all their passions and pursuits violent. They had poetry, but it was altogether of the terrible kind; the whole muster-roll of their mythology consisted of not more than from forty to fifty gods and goddesses, while those of Greece amounted, in Hesiod's time, to three thousand; and in that of Augustus, to thirty thousand. The same power who, under the name of Loke, was their Ahriman, or Principle of Evil, was also, for want of a larger establishment, their Momus and their Mercury. As they had their war-songs and their war-speeches, they had also their Apollo; but, like the rest, he too was caparisoned with

his javelin and his hauberk, and was a god of battles as well as of eloquence. The beatitudes of their paradise, those with which the most valiant of their heroes were rewarded after death, consisted, as we learn from the same bloody legends, in daily encounters of more than mortal fury; in the course of which the different combatants, mounted on fiery steeds, and clothed in resplendent armour, mutually wounded, and were wounded in return. Though, when the battle was over, they bathed in fountains of living water; and being instantly healed, sat down to a sumptuous banquet, at which Odin, their chief deity, presided, and passed the hours of midnight in singing war-songs and drinking goblets of mead. Even the web of future events, woven by their three PARCÆ, was manufactured of strings of human entrails, the shuttles being formed of arrows dipped in gore, and the weights of the sculls of gasping warriors. It is to this fiction Mr. Gray alludes so finely, but, at the same time, so fearfully, in his Ode entitled "The Fatal Sisters."

Now the storm begins to lower,
(Haste! the loom of hell prepare;)
Iron sleet of arrowy shower
Hurtles in the darken'd air.

Glittering lances are the loom
Where the web of death we strain;
Weaving many a soldier's doom,
Orkney's woe, and Randver's bane.

See the gristly texture grow!
'Tis of human entrails made: —
And the weights that play below —
Each a gasping warrior's head.

Shafts for shuttles, dipp'd in gore,
Shoot the trembling cords along.
Sword! — that once a monarch bore,
Keep the tissue close and strong.

Horror covers all the heath: —
Clouds of carnage blot the sun: —
Sisters! weave the web of death: —
Sisters! cease — the work is done!

The armies of the south of Asia, however, under the banners of Mahomet, were as little disposed, at least on the first spur of their fury, to attend to the voice of literature, as those of the north. Yemen, or Happy Arabia, till the time of this accomplished impostor, was equally the seat of polite learning and of courage. It was in climate and language, as well as in elegant pursuits, the Arcadia of the eastern world. Here the genius of poetry received his birth, and was nursed into maturity with fond and incessant attention. The Persians caught the divine art from the Arabians, as the Greeks afterwards caught it from the Persians. The best pastoral poems in the world, or Casseidas, as they are called, and some of the best epic productions, are of Arabian growth. Before the era of Mahomet, a kind of poetical academy was established in this quarter, which used to

assemble, at stated times, in a town named Ocadeh; where every tribe attended its favourite poet on his recital of the piece prepared for the occasion, and supported his aspiring pretensions. Those declared by the appointed judges most excellent, were transcribed in characters of gold on Egyptian paper, and hung up in the temple of Mecca; and the seven which constitute the Moallakat, or suspended eclogues, best known in Europe, are well worthy of the celebrity they have attained.

On the appearance of Mahomet, Arabia thronged with poets of this description, and of high and justly distinguished characters; most of whom, moreover, to their honour, opposed his pretensions, and many of whom ridiculed them with a severity which he never either forgave or forgot. As he advanced, however, in success, poetry and eloquence, and scientific pursuits of every kind became neglected and even despised, except so far as they could contribute to the promotion of his interest; the refined and elevated contests at Ocadeh were dropped, and every other passion was made to bend to the master-passion of the day. And hence, on the capture of Alexandria by the forces of Omar, the second in succession to Mahomet, the whole of its magnificent library, which had been accumulating from the time of its illustrious founder, was condemned to the flames, and served as fuel to the hot-baths for a

period of six months. Amrus, the general of Omar's army, was a lover of letters, and the esteem he had contracted for Philoponus, one of the most learned Alexandrians of the day, strongly inclined him to spare this invaluable treasure. He wrote, therefore, to the Caliph in its behalf, and the answer received from him is well known from Abulpharagius's history: "As to the books of which you make mention, if there be contained in them what accords with the Book of God (meaning the Alcoran), the Book of God is all-sufficient without them: but if there be any thing repugnant to that book, we can have no need of them. Order them, therefore, to be all destroyed."

The wild-fire of Asia enkindled an equal wild-fire throughout Europe. Of the purity of the motive upon which the crusades were first founded there can be no doubt; but the unfortunate course they took, and the mistaken views and ferocious passions to which they gave birth, rendered them, on the part of the Christians, as hostile to the cause of science and literature, to say nothing of higher objects, as the fury of the Saracens. Every thing was forsaken and forgotten in the accomplishment of the only object with which Christendom was now pregnant; every knee bowed down before the standard of the cross; the religion of love was converted into a religion of vengeance; the motto of Mecca became that of the Vatican; to fight for the faith was here also

declared to be an act of obedience to God *, and every pulse beat high with an unconquerable determination to rescue the Holy Land, and trample upon its defilers.

Hence the origin of the various military orders which form so prominent a feature in the history of this period of the world; of the Knights of Malta, or of the Hospital of St. John of Jerusalem, as they were at first called; the Knights Templars; the Teutonic Order; and the Order of St. Lazarus. Hence, too, that spirit of chivalry and romantic adventure, of tilts and tournaments; which, however it may have laid a basis for a thousand interesting tales of wild exploit and marvellous vicissitude†, had a tendency to change the sober order of things; to convert the patriotic citizen into a champion of fortune, and to work

* The following is a part of the famous bull of pope Gregory IX., published in 1234, in which he exhorts and commands all good Christians to assume the cross and join the expedition at that time preparing against the Holy Land. "The service to which mankind are now invited is an effectual atonement for the miscarriages of a negligent life. The discipline of a regular penance would have discouraged many offenders so much that they would have had no heart to venture upon it: but the HOLY WAR is a compendious method of discharging men from guilt, and restoring them to the divine favour. Even if they die on their march, the intention will be taken for the deed; and many in this way may be crowned without fighting." — Collier's Eccl. vol. i.

† Sainte-Palaye: Mémoires sur l'Ancienne Chevalerie, tom. i. p. 153. et seq.

up the temperate reality of life into a fitful and visionary frenzy.

And hence, too, amongst those who confined their views altogether to subjects of personal devotion and still life, the extension, though not the rise (for they were already in existence) of religious orders, of pilgrimages, and hermit solitudes; of vows of celibacy and fasting, of severe penance and rigour; under the preposterous idea of propitiating the Supreme Being in favour of his own cause, by directly warring with the best and warmest, the most active and most benevolent passions and instincts which he has imprinted on the human heart for the multiplication of human happiness.

The crusades were numerous, but there are only seven that are worthy of particular notice. Of these, the first was led by Godfrey of Bouillon, in 1096, and was the only one that proved really successful; and that actually rescued, though only for a few years, the whole of Palestine from the grasp of the Mahometans. The third is chiefly celebrated for the chivalrous and enthusiastic valour with which it was prosecuted under our own Richard I. in 1189; and for the generous magnanimity of Saladin, who was at that time the Saracen king of Jerusalem. The two last were headed by St. Lewis in 1248 and 1270; and are principally notorious for the piety and valour which he displayed, and the misfortunes which attended him.

The scenes of havoc and barbarity to which

this infatuating system gave rise on both sides, are too shocking for narration, and too long to be recounted, even if we had time. The wild desire of foreign expurgation led to a similar desire of purging the church at home; and hence the establishment of the Holy Wars led to the establishment of the Holy Inquisition;—the extirpation of infidels to the extirpation of heretics. Hence the crusaders under Baldwin, count of France, when advancing towards Palestine, in 1204, by a sudden and delirious impulse, turned aside from their attack upon the Mahometans, and attacked the Greek Church in its stead, on account of its supposed heterodoxies; and took and ransacked Constantinople, instead of taking and restoring Jerusalem.

The brutal havoc which followed upon this expedition, and the destruction of all the finest statues and public monuments erected by Constantine on his founding the city, are described with much force and feeling by Nicetas the Chroniate, who was an eye-witness to the transaction, and who justly styles these crusading Vandals, Τῶ καλῶ ἀνεραστοῖ Βαρβαροῖ *: "Barbarians insensible to the fair and beautiful." He especially laments the destruction of the inimitable figures of Hercules and Helen, which being constructed of brass, were melted down to pay the soldiers. The following is a part of his description of the latter statue, and I quote it from the translation

* Fabricii Biblioth. p. 412.

of Mr. Harris, as a proof that Constantinople, even in the thirteenth century, had scholars not altogether destitute of literary taste. "What," says he, "shall I say of the beauteous Helen; of her who brought together all Greece against Troy? Does she mitigate these immitigable, these iron-hearted men? No — nothing like it could even she effect, who had before enslaved so many spectators with her beauty. Her lips," continues he, "like opening flowers, were gently parted, as if she were going to speak: and as for that graceful smile, which instantly met the beholder, and filled him with delight; those elegant curvatures of her eye-brows, and the remaining harmony of her figure; they were what no words can describe and deliver down to posterity." *

From the same demoniac spirit proceeded the infuriate crusade against the virtuous Albigeois or Albigenses in the thirteenth century; and the long and savage persecutions of the Waldenses or Vaudois, which continued almost without intermission for eighty or ninety years; and the depopulation of Spain, by an equal expulsion of Jews and Moors, when the Christian arms had once more proved successful in that country. It was during the crusade against the Albigeois (and it is the only anecdote I need advance in proof of the blind and indiscriminate fury with which these adventures were conducted) that, when a scruple arose among the crusading army

* Harris, ii. 455, 456.

as to the propriety of storming the city of Bezieres, after having made preparation for so doing, in consequence of its being peopled with catholics as well as with heretics: a dexterous casuist settled the point abruptly, by exclaiming, "Kill them all: God knows which are his own." *

Independently of any other cause, therefore, it must be obvious that the internal disputes of the Christian church itself, or rather that which was called Christian, in which every nation, and almost every individual took a part, were alone sufficient to have repelled the progress of liberal and enlightened science. But beyond this, very soon after the introduction of Christianity, a fondness for the philosophy of Plato and Pythagoras prompted the more speculative ecclesiastics to investigate the mysteries of the divinity and humanity of our Saviour with too nice a curiosity; and hence the famous controversies of Praxeas, Sabellius, Arius, Nestorius, Eutyches, and various others, most of which led to very extensive proscriptions and persecutions. The schoolmen carried this itch for discussion into the most visionary subtleties of metaphysics, and acquired high-sounding titles by devoting the whole of their lives to an investigation of trifles that would disgrace a nursery. The bishops of Rome, after having advanced themselves to the popedom or supremacy of the Church, and invested them-

* Hist. des Troubadours, i. 193.

selves with territorial power, soon began to arrogate a temporal as well as a spiritual supremacy throughout Christendom; and hence the different courts of Europe, and at times even the emperors, were in a state of perpetual hostility with them; sometimes the emperors obtaining a triumph and deposing the popes, and sometimes the popes proving successful and deposing the emperors; and hence the separation of the Greek church from that of Rome, in the middle of the ninth century, and of the English church towards the beginning of the sixteenth.

There is another cause, and it is the last I shall notice, which powerfully contributed to the night of error and ignorance, which overspread the moral horizon during the melancholy period before us; and that is, the general chaos which prevailed in the language of almost every nation of the civilized world, and the consequent want of some current medium of communication. It was a maxim of the Roman government, and of a most artful and politic character, and which, in our own day, has been closely copied by the crafty tyrant of France *, to plant its vernacular tongue wherever it planted its arms. Greece formed the only exception to this general rule; and, from its admitted superiority of taste and genius, was allowed to teach its conquerors instead of being taught by them. With this exception all the rest of Europe was latinized in a

* This lecture was delivered in 1813, during the domineering power of Buonaparte.

greater or less degree. The latinity, indeed, was of the most barbarous kind imaginable — for the dialect was, in almost every instance, a mongrel breed of Roman and aboriginal terms, with imperfect inflexions and unauthorized idioms, ready for any other change that chance might suggest or future conquest impose.

The barbarian conquerors of the north, however, seem to have cared as little about their respective dialects as about their religion; and, hence, in both instances, they gave and took alternately with the different nations that submitted to their yoke. Yet as fresh tides of invaders poured forward, the Latin character progressively died away; and pure Latin was at length no longer known except as the language of the learned. Even in Rome itself it ceased to be spoken at the commencement of the seventh century; and the descendants of Cæsar and Cicero, and Virgil and Horace, were incapable of reading the immortal productions of their forefathers. It had already ceased for some ages to be employed in the Greek empire; having here been supplanted by the Greek tongue itself, the prevailing language of the country, and the fashionable language of every polite Roman, shortly after the removal of the imperial court to the eastern metropolis, in the reign of Constantine.

With respect to language, Mahomet pursued the same plan as the Romans. Wherever he conquered he introduced the Alcoran,

and compelled every nation to read and to understand it in his own tongue. And hence, during the seventh, eighth, and ninth centuries, the only genuine languages spoken throughout the civilized world were Greek and Arabic; both derived from a similar source, and of very early origin; and both existing without any very great degree of variation to the present hour; but neither of them employed at any time as a vernacular tongue, in the north or south, or even the west of Europe, except in Spain, where the Arabic was used during the dominion of the western caliphat in that country. In consequence of which the latinity of the Spanish tongue is considerably tinctured with Arabic terms and phraseologies, and possesses less resemblance to its Roman origin than the Portuguese, which, as being more remote, was less affected by the Saracen invasion and conquest.

The controversies of the church, and the subtle logomachies, or word-wars of the schoolmen, were conducted sometimes in Greek, but far more generally in Latin. And as only the former of these tongues was known to the people of the eastern, and neither of them to those of the western empire, the laity, in general, were completely cut off from all knowledge of the little and only learning that was alternately exercised, excepting as occasionally explained to them in whatever might happen to be their vernacular tongue.

Upon the fall of the Latin language, the rude

dialect that was most approved in France and Italy was the Provençal, or that made use of in Provence and its vicinity; and it was hence exclusively employed by the Troveurs or Troubadours, as they were called, Provençal poets that about the commencement of the eleventh century began to flourish very numerously; and by the complimentary and licentious gaiety of their incondite rhymes, to obtain an establishment in almost every court of Europe.

The times, indeed, were well calculated to promote their object; for there is, perhaps, hardly a vice that can be enumerated in the whole catalogue of moral evil that did not at this era of ignorance brutalize the human heart; and even the devotees themselves consisted, for the most part, of worn-out profligates, who had no longer the power of indulging their sensual gratifications. Such, among others, was William IX., count of Poictou, who was one of the earliest Provençal poets, and is equally celebrated for the unbridled debauchery of his earlier life, and the sanctimonious pretensions of his old age. Who at first founded an abbey for women of pleasure, and afterwards converted it into a nunnery for the chaste and the pious; and who, on being rebuked and excommunicated in the midst of his infamous career, by his own bishop, seized him by the hair, and was on the point of despatching him, but suddenly stopped short, and exclaimed, "No — I have that hatred of thee, thou shalt never enter heaven through

the assistance of my hand." "Nec cœlum unquam intrabis meæ manus ministerio." *

Respecting another court and people in the neighbourhood of Poictou, we are told by an excellent contemporary writer, that all the men of rank were so blinded by avarice, that it might truly be said of them, in the words of Juvenal,

> Unde habeas, quærit nemo, sed oportet habere.†
> None car'd what way he gain'd, so gain were his.

"The more they discoursed about right, the greater their enormities. Those who were called justiciaries, were the head of all injustice. The sheriffs and magistrates, whose immediate duty was justice and judgment, were more atrocious than the very thieves and robbers; and were more cruel than even the cruellest of other men! The king himself, when he had leased his domains as dear as was possible, transferred them immediately to another that offered him more; and then again to another, neglecting always his former agreement; and still labouring for bargains that were greater and more profitable." ‡

I have observed that in the midst of this long and gloomy night a few bright and splendid stars shot occasionally a solitary gleam athwart the horizon; and, in one or two corners of it, a radiance at times poured forth like the dawn of the morning. Several of the Arabian caliphs, as

* Malmesbury, p. 96. fol. ed. 1596.
† Juv. xiv. 207. ‡ Harris, ii. 515.

soon as the first paroxysm of their violence was exhausted, returned to that general love of literature which had immemorially been characteristic of their country. And hence, when Europe was plunged into its thickest midnight, the eastern and western caliphats, or courts of Bagdad and Cordova, (by far the most illustrious in Saracenic history) evinced a lustre and a liberality that were nowhere else to be met with, and opened asylums to the learned of every country.* "It was then," says Abulfeda, who was himself one of the brightest gems that adorned the former court, "it was then that men of learning were esteemed luminaries that dispel darkness, lords of human kind, destitute of whom, the world becomes brutalized.†" And from the account of the Arabic manuscripts of the Escurial, drawn up by the learned Casiri, it appears, that the public libraries in Spain, when under the Arabian princes, were not fewer than seventy: a wonderful patronage of literature, when copies of books were peculiarly scarce, and enormously expensive.

The tie, however, between science and Islamism was unnatural, and could not continue long. The religion of Mahomet is, of itself, a choak-damp to every generous purpose of the soul; no moral harvest can flourish under it; and the few instances that it can boast of to the contrary are

* Leo Afric. De Vir. Illustr. apud Arab. Bibl.

† Abulphar. Dynast. p. 160.

only exceptions to the general rule: scarce and scattered oases, or plots of verdure, that unexpectedly peep forth in the vast ocean of its sandy desert. All Mahommedan patronage of learning, therefore, has long since died away; and Arabia, which once shed so splendid a light on the rest of the world, is now sunk in darkness, while all the rest of the world is beaming with light around it. "Those vast regions," observes M. Sismondi, with a just feeling of regret, "where Islamism rules, or has ruled, are dead to all the sciences. Those rich fields of Fez and Morocco, made illustrious through five centuries by so many academies, so many universities, so many libraries, are now nothing more than deserts of burning sands, where tyrants dispute with tigers. All the laughing and fruitful coast of Mauritania, where commerce, arts, and agriculture were raised to the highest prosperity, are at present mere retreats for pirates, who spread terror, and resign their toils for abominable indulgences, as soon as the plague returns every year to make victims of them, and to avenge offended humanity. Bagdad, formerly the seat of luxury, of power, of knowledge, is in ruins. The far-famed universities of Cufa and Bassora are closed for ever. That immense literary wealth of the Arabians, which we have only had a glimpse of, exists no more in any region where Arabians or Mussulmans govern. We are, no longer to seek there for the fame of their great

men, or for their writings. Whatever has been preserved is entirely in the hands of their enemies, in the convents of monks, or the libraries of European princes. Yet these extensive countries have never been conquered: it is no stranger that has plundered them of their riches; that has annihilated their population; that has destroyed their laws, their manners, and their national spirit. The poison has sprung from themselves; it has risen indigenously, and has destroyed every thing.*"

Of the little genuine learning that appeared in Christendom, to temper the gross ignorance of the times, it is to the praise of the Church that by far the greater part of it, both in the eastern and western empire, was the rare boast of ecclesiastics. And it is especially to the praise of our own country, and peculiarly to that of our very ancient universities, both which can lay claim to an origin coeval with the middle period of the Anglo-Saxon octarchy, that more than half the most celebrated scholars of the times were of British birth and education. Such were Aldhelm, Bede, and Alcuin, the three great Anglo-Saxon luminaries of the eighth century, and the last of whom was the tutor and confidential friend of Charlemagne. Such was Ingulph of the eleventh century, made abbot of Croyland, by William the Conqueror, and to

* De la Littérature du Midi de l'Europe, tom. i. Paris. 4 tom. 1813.

whose history we are indebted for much that has descended to us of the era we are now surveying. Such, too, were John of Salisbury, Girald the Cambrian, and the monks Adelard and Robert of Reading; the two last of whom had travelled into Egypt and Arabia, and had studied mathematics at Cordova; and the former of whom translated Euclid out of Arabic into Latin; a clear proof, however, that Greek, the language in which Euclid himself wrote, was but little known at this time among men of letters in England. Such also was Roger Bacon, of the thirteenth century, whose knowledge of physics had so far outstripped that of all his contemporaries that, like Petrarch some ages afterwards, his wonderful attainments were ascribed to magic, and his holding an intercourse with the devil. And such, to close the list, was Wyckliff, in the fourteenth century, the bright and splendid phosphor of the glorious Reformation.

These, and as many more, had I time to enumerate them, were furnished from the church. Nor has the laity any reason to be ashamed of its contributions: Sir John Fortescue brilliantly adorned the fifteenth century, Sir John Mandeville the fourteenth; which was also enlightened by the combined and powerful talents of Gower and Chaucer, of Dante, Petrarch, and Boccace. Henry I, and Henry II. are nearly equally celebrated in the twelfth century, for their patronage of learning and learned men, and especially for their

promoting the purest taste in Gothic architecture; during whose reigns, the most sumptuous and admired of our national buildings of this kind were erected. The eleventh century is peculiarly signalized by the splendid talents and learning of Egitha, queen of Edward the Confessor, who, in the language of Ingulph, was equally admired for her beauty, her literary accomplishments, and her virtue. Let us ascend a century higher, and close the whole with the sacred name of Alfred; a name, no Englishman ought to pronounce without homage: equally tried, and equally triumphant in adversity and prosperity; as a legislator and philosopher; as a soldier and politician; a king and a Christian; the pride of princes; the flower of history; and the delight of mankind.

We have thus rapidly travelled over a wide and dreary desart, that, like the sandy wastes of Africa, to which we have just referred, has seldom been found refreshed by spots of verdure, or embellished by plants that should naturally belong to the country:—and what is the upshot of the whole?—the moral that the survey inculcates?—Distinctly this;—a moral of the utmost moment, and imprinted on every step we have trodden;—that ignorance is ever associated with wretchedness and vice, and knowledge with happiness and virtue. These connexions are indissoluble; they are enwoven in the very texture of things, and constitute the only substantial difference between man and man. For, if we except

these distinctions, "all men," observes one of the most enlightened writers of this dark period, to whom I have already adverted, John of Salisbury, who was contemporary with Stephen and Henry II., and whose classical Latin I shall put into literal English, "all men throughout the world proceed from a like beginning; consist of, and are nourished by like elements, draw from the same principle, the same vital breath, enjoy the same care of heaven, pass through life alike, and alike die." *

To which I shall only add, that, as Christianity is the most perfect kind of knowledge, it must essentially produce the most perfect kind of happiness. It is the golden everlasting chain let down from heaven to earth; the ladder that appeared to the patriarch in his dream; when he beheld Jehovah at its top, and the angels of God ascending and descending with messages of grace to mankind.

* De Nugis Curialium; Harris, ii. 525.

LECTURE XIII.

ON THE REVIVAL OF LITERATURE.

In the last lecture, we continued our progress through that general history of science and literature, which we had commenced in the lecture that preceded it; and having, in the first of these studies, brought down the subject from the most celebrated times of Athens and Rome to the decline of the Roman empire; we waded, in the second, through the barren and cheerless period of the dark or middle ages, extending from the fall of Rome before the barbarous arms of the Goths, in the fifth century, to the fall of Constantinople before the no less barbarous arms of the Turks, in the fifteenth century;—exploring our way as well as we were able, by the occasional guidance of a few transitory and uncertain beacons, amidst the desolate realms of mental darkness and chaos by which we were surrounded, till we reached the auspicious hour in which the voice of the Almighty once more exclaimed throughout the dead and dreary waste, "LET THERE BE LIGHT!—AND THERE WAS LIGHT."

The period of the revival of letters in Christendom, is, in many respects, one of the most brilliant eras in human history. Without the

intervention of a miracle we behold a flood of noon-day bursting all at once over every quarter of the horizon, and dissipating the darkness of a thousand years; we behold mankind in almost every quarter of Europe, from the Carpathian mountains to the Pillars of Hercules, from the Tiber to the Vistula, waking as from a profound sleep to a life of activity and bold adventure; ignorance falling prostrate before advancing knowledge; brutality and barbarism giving way to science and polite letters; vice and anarchy to order and moral conduct; and idolatry, hypocrisy, and superstition, to the pure simplicity of Christian truth. Hence, in some places, we trace the fall of feudal slavery and vassalage—in others of popish tyranny and imposition — and in every place a juster sense of relative duties and of the real dignity of man. Hence the origin of those important inventions, paper and clock-making, printing, telescopes, and gun-powder; and hence, too, the first insight into the modern doctrine of the circulation of the blood; and the wonderful discoveries of the mariner's compass, the sphericity of the earth's surface, and the revolution of the planets around the sun. Hence, Portugal, with a bold and adventurous canvas doubled the Cape of Good Hope, and realized a maritime passage to India; Spain explored and established herself in a new world; and England, in the person of the intrepid Drake, for the first time circumnavigated the globe; while Gallileo, by the marvellous inven-

tion and application of his telescope, unfolded to us not another world alone, but systems of worlds upon worlds in endless succession throughout the heavens ; all which astonishing series of splendid facts and transactions, together with various others of nearly equal importance, crowd upon each other within the short period to which we are now confining our attention, extending from the beginning of the fourteenth to about the middle of the sixteenth century. The heart of man seemed to beat with a new and more vigorous pulsation, and all the energies of the soul to be roused to the proudest darings of adventure.

In contemplating the causes of that wonderful change in the character and pursuits of civilized Europe, which this extraordinary combination of circumstances indicates, the following may, perhaps, be regarded as amongst the principal.

First, the natural spring or elasticity of the human mind, by means of which, though it may for a time be borne down by a weight of ignorance or oppression, it at length rouses from its torpitude, resumes its innate energy, and shakes off the vampire burden with a recoil proportioned to the pressure that subdued or stifled it.

Secondly, the sudden flight and dispersion of the best and almost the only literary characters of the age from the walls of Constantinople, upon the capture of this elegant and renowned city by the Turks, under the victorious banners of Mahomet II.

Thirdly, the taste for literature which, at this

very period, was reviving in many of the Italian states, and more particularly at Florence under the illustrious family of the Medici; and especially the election of the celebrated Giovanni de'Medici to the pontificate, under the name of Leo X.

Fourthly, the facility afforded by the art of printing, discovered at the very period of the fall of Constantinople, to the diffusion of useful and polite learning in every direction.

And, fifthly, and, perhaps, chiefly, the general attention and spirit of inquiry which were excited throughout every country in Christendom, by the grand and eventful drama of the Reformation at this time exhibiting in Germany.

Let us attend to each of these causes in the order in which I have stated them.

I. Vice and ignorance are the necessary companions of each other: such is the immutable law of nature; and we can no more reverse it, than we can reverse the stars in their courses; and nothing can exceed the extreme to which both were carried during the period of the fourteenth and fifteenth centuries; and to which the whole texture of the feudal system, and the abominations of the Vatican tyranny, equally contributed.

When the barbarous and intermixed tribes of Goths, Huns, and Vandals, poured down in successive streams from the north, and overran the different provinces of the Roman empire, the conquered lands distributed by lot, and thence called *allotted* or *allodial*, were held in entire sovereignty by the different chieftains, without any

other obligation existing between them than that of uniting on great occasions to defend the community. Additional tribes still succeeded: — wider tracts of country were subdued, and many individuals occupied land to a very considerable extent; while the king or captain-general, who led on his respective tribe to conquest, naturally acquired by far the largest portion of territory as his own share. These lands he found it convenient, in order to maintain his influence, to divide among his principal followers, merely subjecting them, for the grant, to certain aids and military services.

His example was imitated by his courtiers, who distributed, under similar conditions, portions of their estates to their dependents. Thus a feudal kingdom became a military establishment, and had the appearance of a victorious army, subordinate to command, and encamped under its officers in different parts of the country; every captain or baron considering himself independent of his sovereign, except during a period of national war. Possessed of wide tracts of country, and residing at a distance from the capital, they erected strong and gloomy fortresses in places of difficult access; and not only oppressed the people, and slighted whatever happened to be the civil magistracy of the state, but were often in a condition to set the authority of the crown itself at defiance.

As the tenure by which the lands were held was military; as there was no art or science to

occupy the mind; as reading was seldom cultivated, and writing a still rarer accomplishment; every landed proprietor was a mere soldier; and being expert and strong by the daily use of arms, was eager for an opportunity of showing his prowess. Nor was such opportunity ever wanting; for, when not employed in expeditions against a public enemy, he was commonly engaged in some petty enterprize at home, prompted by pride, avarice, or revenge. Hence *feuds*, as indeed the term itself imports, were the peculiar characteristic of *feudal* power; vice and idleness were perpetually engendering animosities; gross ignorance disabled the different parties from adjusting them by the address of argument and fair reason; brutal obstinacy rendered them hereditary; and the son who succeeded to his father's estate succeeded also to his quarrels.

While such was the ready aid which the political system of the times administered to the gloomy reign of mental darkness and disorder, the gross misconduct of the church was still more instrumental in promoting the same direful effect. Although nothing is more clear than that, through the whole of this desolate period, God never left himself without a witness of the truth, the purity, and the power, of the genuine doctrines of Christianity; although nothing is more clear than that, even in the deepest midnight of this desolate period, a few honest, zealous, and conscientious ecclesiastics, and even laymen, are to be met with who sedulously and

manfully opposed themselves to the general corruption of their contemporaries, it is equally clear, that the great mass of the priesthood assumed the sacred habit for the mere purpose of indulging more effectually in the worst and most licentious passions and appetites; and surpassed all the rest of the community in the irregularity and scandal of their lives. Many of them were professed infidels, and exclaimed openly to each other, "*Quantas divitias nobis peperit hæc Christi fabula!*"— "What wealth does this fiction of Christ obtain for us!" A sentiment generally ascribed to the free-thinking genius of Leo X., but which, whether ever uttered by him or not, was in frequent use long before his era; while nearly all concurred in the well-known motto that "ignorance is the mother of devotion."

In truth, it requires no ordinary stock of temper to wade through the scenes of abominable filth and bare-faced hypocrisy which characterise the *holy fathers* of the church, as they were impiously denominated, at the period immediately before us. Crusades, indeed, had long been in use for the extirpation of infidelity, and there were occasional triumphs of the Cross over the Crescent; but, like most other pretensions to ecclesiastical zeal and devotion, even these had for the most part been perverted to the sinister purposes of avarice, temporal authority, or revenge; while plenary indulgences and remissions of sin, for given periods of time, or, in

other words, formal licences to live a life of unrestrained debauchery, and gratify every libidinous appetite and inclination for the term specified, had, during the existence of many crusades, been openly granted at the Vatican, as well as distributed for this purpose by its commissaries, all over Europe, to every one who would either consent to join the sacred standard in person or hire a substitute to fight for him. And similar indulgences were continued after their cessation, and were notoriously bought and sold at a settled or market-price.

This was strikingly exemplified during the papacy of Urban II. in the year 1100; while it is admitted by the warmest advocates of the Vatican that the famous fabric of St. Peter's church at Rome was paid for under Leo X. out of the same resources; which they venture to urge, indeed, in justification of the measure *; as though crimes could change their nature by the end for which they are perpetrated.

One of the fittest instruments for this traffic of abomination was the notorious Dominican inquisitor John Tetzel, who, true to his own trade, led so abandoned a life of debauchery that he was at length condemned to death by the Emperor Maximilian for the crime of adultery, accompanied with very atrocious circumstances; and was saved from undergoing the punishment

* See Dupin, book ii. ch. i.; as also Roscoe's Life of Leo X. vol. iii. p. 150.

with great difficulty. He had the effrontery to boast that he had saved more souls from hell by his indulgences than ever St. Peter had converted to Christianity by his preaching.

This juggler in iniquity, however, was at times himself out-juggled by others; and the following instance of his being over-reached, as gravely related by Sechendorf, will show that the mummery of his trading was as ridiculously absurd as it was grossly nefarious. A man of some rank at Leipsic, who was disgusted with his villany, and determined to be even with him, applied to him for information whether he could grant absolution for a sin of a particular kind intended to be perpetrated, but to be kept a secret till the time. Tetzel replied boldly that he could readily do so, provided the payment were made equal to it. The bargain was instantly struck, the money paid down; and the diploma of absolution signed, sealed, and delivered in due form. The purchaser, thus empowered, waited quietly till Tetzel, having collected from Leipsic and its neighbourhood all the money he was able to lay hold of, set off for his home richly freighted. The man of absolution followed him right speedily; overtook him on the road; plundered him of the whole of his fraudulent gain, and, having beaten him soundly at the same time over the shoulders, produced his patent of absolution, avowed that this was the sin he had purchased leave to commit, and sent him back to Leipsic to tell his own story.

If we turn immediately to the Vatican itself, and observe the personal conduct of the direct successors to the chair of St. Peter, and of the sacred college by which they were surrounded, what is the picture which is unfolded to us? We behold pope fighting against pope, cardinals, in a multiplicity of instances, against cardinals *; the former occasionally deposed, and the latter still more frequently strangled. We behold Leo X., when only an infant of seven years old, made abbot of the rich benefice of Fonte-dolce; a few years afterwards holding not less than twenty benefices equally rich and valuable at the same time; and nominated to the grave and venerable college of cardinals at the age of thirteen. We behold Alexander VI., a near predecessor of Leo X., living incestuously with his own daughter, the loose but beautiful and accomplished Lucretia Borgia, a common prostitute to her father and her two brothers; and we behold one of the brothers assassinating the other, and shortly afterwards her legitimate husband, in the precincts of the apostolic palace, and upon the threshold of St. Peter's church, from a jealousy of their superior pretensions to her favour. † While, to close the whole, for it is disgusting to wade in such a slough of moral filth, we behold the council of Lateran inveighing with all its authority against the scandalous lives

* Roscoe, vol. ii. p. 104.

† Id. vol. i. Subjoined Dissertation, pp. 8—11.

of many of its own ministers, who, not satisfied with living in a state of concubinage themselves, consented to receive the wages of iniquity, and sell licences to the laity for the grant of a like indulgence. *

But it may, perhaps, be said, that in these instances the soft enervating power of an Italian climate, and the licentious habits which so peculiarly characterised the decline of the Roman empire, and which to the period before us had never been altogether eradicated, laid a foundation for vices which would not otherwise have been exhibited. Let us then direct our attention to a climate of another kind; let us turn to the hardy and proverbially virtuous inhabitants of Scotland, and proverbially virtuous, too, from the very nature of the climate itself: what was the effect of ignorance and papal superstition amidst the corruption of the fourteenth and fifteenth centuries upon the physical temperance and chastity of the Highlands? The following is Dr. M'Crie's account in his life of John Knox, and which he supports by sufficient authorities: —

" The corruptions by which the Christian

* Quia verò in quibusdam regionibus nonnulli jurisdictionem habentes, pecuniarios quæstus à concubinariis percipere non erubescunt, patientes eos in tali fœditate sordescere, sub pœnâ maledictionis æternæ præcipimus, ne deinceps sub pacto, compositione aut spe alterius quæstûs, talia quovis modo tolerent, aut dissimulent. — S. S. Concil. tom. xiv. p. 302.

religion was universally depraved, before the Reformation, had grown to a greater height in Scotland than in any other nation within the pale of the western church. Superstition and religious imposture, in their grossest forms, gained an easy admission among a rude aud ignorant people. By means of these the clergy attained to an exorbitant degree of opulence and power; which were accompanied, as they always have been, with the corruption of their order, and of the whole system of religion. The full half of the wealth of the nation belonged to the clergy; and the greater part of this was in the hands of a few of their number, who had the command of the whole body. Avarice, ambition, and the love of secular pomp, reigned among the superior orders. Bishops and abbots rivalled the first nobility in magnificence, and preceded them in honours. They were privy-councillors and lords of session as well as of parliament, and had long engrossed the principal offices of state. A vacant bishopric or abbacy called forth powerful competitors, who contended for it as for a principality or petty kingdom: it was obtained by similar arts, and not infrequently taken possession of by the same weapons. Inferior benefices were openly put to sale or bestowed on the illiterate and unworthy ministers of courtiers; on dice-players, strolling bards, and bastards of bishops. — There was not such a thing known as for a bishop to preach: — the practice was even gone into desuetude among

all the secular clergy, and wholly devolved on the mendicant monks, who employed it for the most mercenary purposes.

" The lives of the clergy, exempted from secular jurisdiction, and corrupted by wealth and idleness, were become a scandal to religion, and an outrage on decency. While they professed chastity, and prohibited, under the severest penalties, any of the ecclesiastical order from contracting lawful wedlock, the bishops set the example of the most shameless profligacy before the inferior clergy; avowedly kept their harlots; provided their natural sons with benefices, and gave their daughters in marriage to the sons of the nobility and principal gentry; many of whom were so mean as to contaminate the blood of their families by such base alliances for the sake of the rich dowries which they brought.

" Through the blind devotion and munificence of princes and nobles, monasteries, those nurseries of superstition and idleness, had greatly multiplied in the nation; and though they had universally degenerated, and were notoriously become the haunts of lewdness and debauchery, it was deemed impious and sacrilegious to reduce their number, abridge their privileges, or alienate their funds.

" The ignorance of the clergy respecting religion was as gross as the dissoluteness of their morals. Even bishops were not ashamed to confess that they were unacquainted with the canon of their faith, and had never read any

part of the sacred Scriptures, except what they met with in their missals."*

It is not, then, to be wondered at, that, under so repugnant and scandalizing a state of things, notwithstanding the darkness and deformity of the times, mankind should in every part of Europe be growing ripe for a change, and that the still small voice of the conscientious few, who exposed and resisted the corruption around them, should be working with a wholesome ferment amidst the general mass; that that elastic power of the human mind, which, in our own day, we have seen in Spain, in Russia, in Germany, and may yet, perhaps, see in France†, rising with indignant recoil against the domestic or foreign tyranny by which it had been long bowed down, should be swelling, and labouring, and maturing to the same effect, in the case before us; co-operating with the intrepid voice of Wickliff in our own country, and with the ashes of Huss and Jeremy of Prague, that were not in vain sprinkled over the guilty soil of Switzerland, and effecting that important revolution, which reason, religion, and common sense, equally vilified and insulted, equally called aloud for and sanctioned.

II. At this very period, in the year of our own era 1445, Constantinople, the delight and glory of

* Life of John Knox, pp. 14—20.

† The prediction is fulfilled. The passage was delivered, during the usurpation of Napoleon, in 1813.

Constantine, who founded and named it after his own name; the metropolis of the eastern empire; the rival of ancient Rome; the seat of elegance, refinement, and luxury; the asylum of science upon its banishment from the west of Europe, by the savage incursions of the northern tribes; where the language of Homer, and Herodotus, and Plato, and Aristotle, and Sophocles, and Demosthenes, was still spoken as the common tongue, and their writings still studied and idolized, — fell prostrate before the haughty banners of the Turks, the most enterprising, but, at the same time, the rudest and most barbarous of all the Saracen powers. All Europe trembled at the intelligence, and an utter extinction was predicted to the little learning and virtue which were now beginning to glimmer in the midst of the general darkness.

The fear, however, was without foundation; and the very event which was apprehended, and with much reason, to be most fatal to the cause of true religion and science, proved most propitious to their promotion. Thus inscrutable are the ways of Providence, in a thousand instances, to the calculations of man, and thus triumphant the Divine government when it seems most trampled upon. The career of the Crescent, though it overran the most delightful provinces of the Greek empire, and spread to an enormous extent towards the East, did not, except in a few instances, advance farther in a north-western direction than the borders of

Transilvania and Hungary; while Italy, whose most renowned scholars had found an asylum at Constantinople, upon its general ravage by the Goths, now offered, in return, to the scholars of Constantinople an asylum from Turkish fury and oppression; thus enabling the elegant and accomplished Greeks, a second time, to give letters to Europe; at this period to the modern world, as they had done two thousand years before to the ancient.

Several of the Italian governments had, indeed, for half a century, begun to feel the importance of literature and science, and consequently to offer protection and patronage to scholars of every description. Florence, Naples, and Ferrara, are particularly entitled to this eulogy; and, in a somewhat inferior degree, Venice, Urbino, Mantua, and Milan. It was a growing spirit, and a growing patronage; till, at length, upon the introduction of Giovanni de' Medici, into the college of cardinals, in 1490, and more especially upon his election to the pontificate in 1513, Rome surpassed every other state in the splendid and extensive encouragement it afforded to wit and wisdom of every kind, (with the lamentable exception of that it ought chiefly to have prized,) but especially to classical literature and the fine arts.

III. The Latin tongue was, at this time, so far revived as to become cultivated and understood in all its elegancies; and Dante, Petrarch, Boccacio, Trissino, Sanazzaro, Ariosto, and a bright

galaxy of other writers, too extensive to be enumerated, had progressively given a character and almost a mature polish to modern Italian. But a knowledge of Greek, the master-tongue of the world, of Attic eloquence and refinement, was but very limited and imperfect, amidst the best scholars of the day; and hence, as I have already observed, the fugitive scholars of Constantinople were hailed in almost every part of Italy, and especially by the splendid and illustrious family of the Medici, first at Florence, and afterwards at Rome. The directors, indeed, of the early studies of Leo X., or Giovanni de' Medici, as he was then called, were partly drawn from this well-spring of genuine taste and genius; Demetrius Chalcondyles, and Petrus Ægineta, both native Greeks, being among the more prominent of his tutors. While, in the very first year of his election to the pontificate, he founded a Greek institute of great extent and magnificence in the centre of the apostolic see; gave a general invitation to young and noble Greeks to quit their country, and take up their residence under his protection; purchased for the accommodation of these illustrious strangers the noble palace of the Cardinal of Sion, on the Esquilian hill, which he splendidly endowed as an academy; and, as far as their talents or education fitted them for the purpose, inducted them into the Roman church, and conferred upon them some of its highest dignities and distinctions.

IV. Nothing could occur more auspiciously to

the zeal and splendour with which this munificent and sumptuous Pontiff was prosecuting the revival of literature than the invention of PRINTING;—that wonderful discovery which has since effected, and which is so well calculated to effect, the most important revolutions among mankind: the noblest art of man, next to the invention of letters; the winged commerce of the mind; the impregnable breast-plate of freedom. We may fairly call it an *invention*, even at the period here adverted to, since, though the same art, as well in the form of stereotype or wooden blocks, and of moveable type, had at this time been in use in China ever since the close of the ninth century, and was encouraged by the patronage of the Emperor Teen Foh *, there is not the smallest ground for supposing, as there is in the case of the mariner's compass, that it was introduced into Europe from any communication with the Chinese empire. Strasburg has the honour of having given birth to this invention in the middle of the fifteenth century, at the very period when Constantinople fell prostrate before the standard of the Crescent. It was for some time kept a profound secret; but it was an art of far too much importance to remain concealed long; and was soon eagerly laid hold of by a variety of spirited and noble Italians, whom the fashion and ardour of the times had stimulated to try their respective powers in the generous contest

* Morrison's Philological View of China, p. 27.

for literary fame and distinction; and applied, upon an extensive scale, to a publication of correct and almost immaculate editions of the best Greek, Roman, and vernacular authors.

Amongst this excellent group, worthy of all praise and immortality, stands first in order of time, and foremost in that of merit, the well-known name of Aldo Manuzio, or Aldus Manutius Bassianus, the intimate friend of Erasmus, born at Bassiano, a village within the Roman territory, in the year 1447: he established his printing school at Venice; invited all the scholars of the age to his assistance; and, in 1494, produced, as the first fruits of the Aldine press, the first Greek poem or Greek book that ever appeared in print, the Hero and Leander of Musæus; which was followed, not many years afterwards, by an accurate edition of the entire works of Plato, at that time the most popular of all the Greek philosophers; introduced by an elegant copy of Greek verses composed by Marcus Musurus, one of the most learned Greeks of the day, who had carefully superintended the press, and justly complimentary to the talents and princely munificence of the head of the church; who, with a singular coincidence of facts, was at that very moment addressing a letter to Musurus, requesting his assistance in the formation of his Greek seminary at Rome. I need not add, that to Musurus, to Aldo, to Agostino Chisi, who also founded, and at Rome itself, a printing establishment of great extent

and celebrity, to scholars and artists of every description and country his patronage, his high approbation, and his pecuniary aid, were dealt out to an extent, and with a liberality, that no other age has ever witnessed either before or since.

Nor did he confine his attention to a restoration of the Greek and Roman languages, or an improvement of his vernacular tongue. Under his auspices a study of the oriental dialects, so necessary to a perfect knowledge of the sacred writings, now first began to engage the attention of the learned. He invited ecclesiastics from Syria, Ethiopia, and other eastern countries. In order to carry this important object into due effect, he established a Syriac chair in the university of Bologna, and appointed the celebrated canon Teseo Ambrogio to be the first professor, who is said to have been acquainted with eighteen different languages, and to have delivered his instructions in the Syriac and Chaldee tongues with the fluency of a native. He patronized the Psalter of Agostino Giustiniani, published at Genoa in 1516, in four different languages; personally perused and superintended, as long as he lived, Pagnini's translation of the Bible from the original Hebrew; and, to sum up the whole, gave every encouragement to that master-piece of learning and labour, the Complutensian polyglot of Cardinal Ximenes; which, with the strictest justice and propriety, was dedicated to him upon

its completion: so that, with perhaps a single exception, we may adopt the following elegant eulogy of Mr. Pope:

> "But see each Muse in Leo's golden days
> Starts from her trance, and trims her wither'd bays;
> Rome's ancient genius, o'er its ruins spread,
> Shakes off the dust, and rears her reverend head.
> Then Sculpture and her sister-arts revive;
> Stones leap'd to form, and rocks began to live:
> With sweeter notes each rising temple rung;
> A Raphael painted, and a Vida sung."

The exception in these verses, to which I refer, is the intimation that the service of the temple was now more pure and appropriate. For the general history of Leo's pontificate, as well domestic as public, abundantly shows that pure, undefiled religion was a very subordinate concern in the estimate of this accomplished high priest. He is accused, indeed, of having been a direct infidel; and of having invented the blasphemous exclamation I have already noticed, "What wealth does this fiction of Christ obtain for us!" I cannot affirm that he never repeated this burst of blasphemy, but it is well known to have been in use long before his day. Nor ought it to be forgotten that it was Leo X. who excited Vida, as he himself tells us, to write his Christiad, upon the simple unadulterated language of the Bible, with an utter omission, for the first time, of all that absurd introduction of heathen mythology into its sacred

mysteries, in which Sannazaro, Torquato Tasso, and even Camoens, have so largely indulged: an omission, which it is difficult to conceive that an infidel, whether secret or open, could ever have suggested or ever allowed. Yet the measures he too often pursued, and especially the sale of indulgences, which we have already touched upon, and shall once more have to notice presently, and the profligate characters whom he employed, or knowingly allowed to be employed, as his delegates in negociating their sale, as well as in effecting various other objects; more particularly that abandoned wretch, John Tetzel, some of whose exploits have already passed before us, give abundant proof that he was satisfied with the pomp and splendour of the church, and had no religious principle at heart. He had a love for its ceremonials, as they gratified his leading propensity of unbounded splendour and magnificence. And as the externals of the church displayed to him a wider field for an encouragement of learning, and criticism, and translations; of founding professorships for foreign tongues; of hunting up sacred manuscripts and records from the East; and for building churches and palaces of unrivalled grandeur and beauty, than any thing else could open to him; he was eager, and even profligate in following up such pursuits, and adding them to his earnest desires to obtain the finest poetry, and music, and eloquence, and sculpture, of his own or any former age: but of genuine, vital religion, the

spiritualized breathings of Gregory I., we have no proofs whatever in any part of the pontificate of Leo X.

In few words, such was the general taste for learning and science that characterized the immediate period before us, that there was scarcely an Italian state which had not its university, its printing press, numerous literary institutions, and poets, historians, grammarians, architects, and musicians, of high and deserved celebrity; while the sacred flame, spreading in every direction, arts, literature, and a bold and adventurous spirit of philosophical research, foreign travel, and commercial speculation, blazed forth, in every direction, from the Po to the Elbe, from the Thames to the Tagus.

V. I have said, that ignorance and vice are inseparable associates. But is the converse of this proposition equally true? We have now seen mankind advancing in the path of knowledge — are knowledge and virtue equally inseparable? I have a pride in answering this question; and dare appeal to every page in the history of the times before us for the truth of its affirmative.

From the first moment that the dawn of literature began to glimmer in the horizon of Italy, where, as I have already observed, it shot forth its earliest twinklings, it pointed, as with the finger of reprobation, to the abominable abuses of the church, and stung to the quick in the satires and brilliant wit of Dante, Petrarch, and Boccacio; the first of whom, in his incom-

parable "Divina Commedia," assigned, without scruple, situations and torments in hell to not less than three or four of the most debauched or most despotic of the popes, apportioning their sufferings to their respective vices and degrees of tyranny while on earth*; the second of whom characterizes the papal court, in one of his sonnets, by the name of Babylon, and declares that he has quitted it for ever, as a place equally deprived of virtue and of shame, the seat of misery, and the mother of error; and the last of whom made it his direct object, in his very popular and entertaining work, the "Decamerone," to expose the whole priesthood to ridicule and contempt; his entire argument consisting of the debaucheries of the religious of both sexes. As learning advanced, these attacks became more frequent; and as the art of printing established itself, the assaults of the

* Those whom he has more especially signalized by their sufferings in the infernal regions are, Pope Nicholas III., whom the poet finds tortured in the gulf of Simony, Pope Boniface VIII., and Pope Clement V. The confession of Nicholas III. is peculiarly striking, who at first mistook Dante, in his transitory visit, for his own successor in the papal chair, whom he had been long expecting: —

"Poi sospirando, e con voce di pianto
Mi disse: Dunque che a me richiedi?
Se di saper ch'io sia ti col cotanto
Che tu abbi però la ripa scorsa,
Sappi, ch'io FUI VESTITO DEL GRAN MANTO," &c.

Inferno, canto xix.

more celebrated writers, of Poggio, Burchiello, Pulci, and Franco, were published at Antwerp, Leipsic, and in other parts of the Continent, as well as in France and Italy; till at length the church, becoming sensible of her danger, and, at the same time, equally sensible of her utter inability to repel the shafts that were levelled against her, attempted, like the grand tyrant of the present day *, to suppress the voice of truth and of public feeling by severe denunciations and punishments; and hence, in the tenth session of the Council of Lateran, immediately before the elevation of Leo X. to the pontificate, decreed, that no one under the penalty of excommunication should dare to publish any new work, without the approbation either of the ordinary jurisdiction of the place, or of the holy inquisition.

Such denunciations, however, had by this time, in a very considerable degree, lost their authority; and even Leo himself, in the zenith of his potency and popularity, and in many respects not popular without reason, fell a sacrifice to practices which, however supported by custom, are equally repugnant to religion and common sense.

I have already described a part, though comparatively but a small part, of the enormous expences into which the prodigal but refined mag-

* Napoleon Buonaparte; the day alluded to being, as already observed, 1813.

nificence of this genuine decendant of the Medici was annually plunging him. His taste for luxury was unbounded; his foreign diplomacy was conducted upon a scale of still greater splendour than his domestic court or his literary establishments; whilst he was at the same time in the regular disbursement of almost incalculable sums for embellishing the Vatican, and augmenting its library with manuscripts collected from every quarter of the globe, and in completing the immense fabric of St. Peter's church, commenced by his predecessor Julius II. The vast revenues of the apostolic see, both temporal and spiritual, were incompetent, by their ordinary channels, to these wide and multifarious demands: he had exhausted the pontifical treasury; and following an example which had too often been furnished by his predecessors, he fell into the absurdity of granting a sale of indulgences for its repletion.

Indulgences were a ticklish subject in the worst of times *; and in the times before us the more conscientious and enlightened churchmen were as little disposed to endure them as the laity. In this respect the feelings of Erasmus, Melancthon, Bucer, and Luther, coincided; but the three former, being

* Yet the Council of Trent has long since established their use as a part of wholesome discipline, by formally decreeing that "the power to grant indulgences by Jesus Christ, and the use of them, is beneficial to salvation."

of mild, conciliatory tempers, remained quiet; while the natural hardihood and high spirit of the last incited him to open resistance. Our time will not allow us to enter into the dispute: the high pontiff, whose natural disposition, it must be admitted, was also conciliatory, stood aloof from it as long as it was possible; but his delegates were, for the most part, incautious, violent, and overbearing; and Luther, in almost every instance, had the advantage of them, as much in dexterity of management as in soundness of cause. The controversy grew wider and warmer: one step led on to another; and the inflexible champion who, at first, only intended to controvert the infallibility of the POPE, at length found himself compelled to controvert that of the CHURCH, and, finally, to regard the high pontiff as ANTI-CHRIST. The contention had now reached its extreme point; and the only alternative that remained to the intrepid monk of St. Augustin was retraction or excommunication. He halted not between two opinions, but boldly braved the latter; and addressing himself to the Emperor Charles V., who presided at the august and crowded diet before which he was summoned; "As Your Majesty," said he, "and the sovereigns now present, require a simple answer, I reply thus, without vehemence or evasion: Unless I be convinced, by the testimony of Scripture, or of plain reason, (for on the authority of the Pope and Councils alone, I cannot rely, since it appears that they have frequently

erred and contradicted each other,) and unless my conscience be subdued by the word of God, I neither can nor will retract any thing; seeing that to act against my own conscience is neither safe nor honest." After which he added, in his native German, the preceding having been spoken in Latin, "Here I take my stand. I cannot act otherwise. God be my help. Amen."

Hie stehe ich. Ich kan nicht anders. Gott helff mir. Amen.

With this noble protest was laid the key-stone of the REFORMATION: the pontifical hierarchy shook to its centre; and the great cause of truth and regenerate religion, which had already made its appearance in Switzerland, under the honest-hearted and undaunted Ulric Zwingle, spread with electric speed over a considerable portion of Germany; and, within the space of four years, extended itself from Hungary and Bohemia to France and Great Britain. That, in the infancy of its progress, various enormities were perpetrated, and that even the conduct of its mighty leader was, in this respect, not at all times irreproachable, must be equally admitted and lamented; but they were enormities merely incidental to the inexperienced season of infancy, and which disappeared as the cause ripened into mature age; while, whatever may have been the occasional violence of Martin Luther, "all parties must unite in admiring and venerating the man who, undaunted and alone, could stand before such an assembly, and vindicate, with unshaken courage, what he conceived to be the cause of religion,

of liberty, and of truth; fearless of any reproaches but those of his own conscience, or of any disapprobation but that of his God." *

Such is a brief glance at the wonderful periods that anticipated and have introduced our own unrivalled era. Long and doubtful was the conflict between intellectual life and death: glimmering slowly succeeding to glimmering; light still struggling with suffocating darkness, not for weeks, or months, or years, but for centuries upon centuries, before the day-spring became manifest. Yet, no sooner had the long-delayed and long-wished for fulness of the times at length arrived, than the marble tomb of ignorance and error gave way, as it were, of a sudden; a thousand glorious events and magnificent discoveries thronged upon each other with pressing haste, to behold and congratulate the mighty birth, the new creation of which they were the harbingers; when, with a steady and triumphant step, the peerless form of human intellect rose erect; and, throwing off from it freshening limbs the death-shade and the grave-clothes by which it was enshrouded, ascended to the glorious resurrection of that noontide lustre which irradiates the horizon of our own day, rejoicing like a giant to run his race.

* Roscoe's Life of Leo X. vol. iv. p. 36.

END OF VOL. II.

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